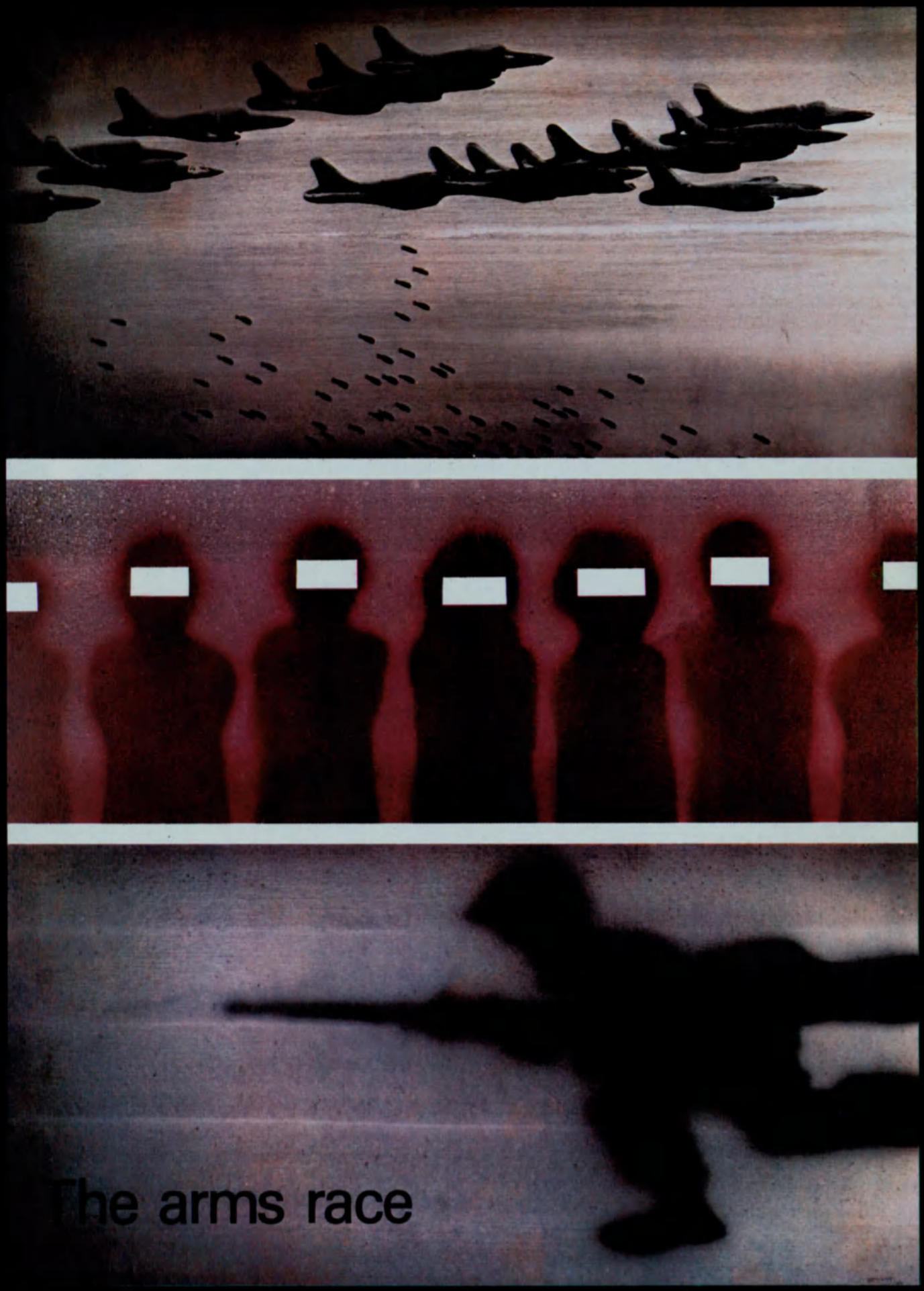
The Unesco Courier

A window open on the world



The arms race

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Photo © Luc Joubert, Bardo Museum, Tunis

Phoenician fertility symbols

In the ninth century BC Phoenicians from Tyre or Cyprus founded the city of Carthage on a site near to that of modern Tunis. These terra-cotta figurines of mother-goddesses soon to give birth were unearthed in a sixth-century-BC Carthage tomb where they had been placed as symbols of life and fertility. Another figurine (25 cm high, 9 cm wide) so similar to that shown at right, that both may have been made in the same mould, has been found in an eighth-century-BC tomb at a Phoenician site at El-Aksib, Lebanon.

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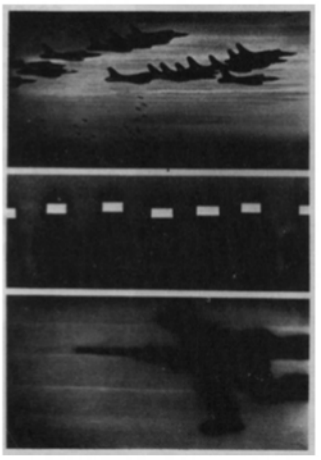
page

page	
4	THE WILL FOR PEACE *by Amadou-Mahtar M'Bow*
6	THE ARMS RACE Military expenditure: the ever-rising tide
10	New technologies for overkill
15	The quality spiral
17	The deadliest weapon of them all?
18	Millions of victims before a shot is fired
20	Human want — the spin-off from military waste
26	Three myths that die hard
29	The military establishment
31	Can the arms race be halted?
34	IN BRIEF
2	TREASURES OF WORLD ART TUNISIA: Phoenician fertility symbols



Cover

Like a juggernaut defying all attempts to control it, the arms race today continues with mounting speed and intensity. The nightmare threat of nuclear war still haunts mankind, and the world's arsenals grow in size and sophistication, fuelling tensions and engendering a mindless waste of resources which could help to alleviate the plight of millions whose basic needs are not met. Cover shows *Testigos* (Witnesses) a vision of this modern nightmare by the Spanish painter Juan Genovés.

Photo © Marlborough Fine Arts, London

The will

by Amadou-Mahtar M'Bow
Director-General of Unesco

SINCE 1945 the disaster of a third world war has been avoided; but at what price has this been achieved? For how many days have the guns been silent throughout the world? Although the field of conflict has shifted towards the poor countries, children, whose lives are no less precious than anyone else's are still dying as a result of war.

Yet the nations, that in this twentieth century alone have sacrificed more than 100 million human beings on the altars of war, continue, as if caught up in the gears of a runaway machine, to dissipate a vast proportion of their genius, of their energy, of their resources, on the manufacture of lethal weapons, ever more sophisticated and devastating. To these nations, the question of disarmament represents an unavoidable challenge.

If we take up this challenge, not only will mankind be delivered from the menace of a hecatomb without precedent but it will also acquire the means to win the struggle against poverty, sickness, ignorance and the other afflictions which beset so many peoples.

If only a proportion of the material and human resources devoted to preparation for war were assigned to the cause of development, it would suffice to change the face of the earth, lessen the widening gulf between rich and poor countries, and reduce the areas of poverty which continue to exist in many industrialized countries. A great number of essential activities, in the fields of nutrition, health, literacy, the development of education, the training of scientific and technological personnel, the establishment of research centres, cultural development, and the safeguarding of the environment, are curbed or even blocked, solely for lack of material resources. This in turn aggravates inequalities, and brings about new situations of tension.

And so in addition to the development of nuclear weapons we have the armaments race in so-called conven-

for peace

tional weapons, which extends to the smallest and poorest States. Thriving on injustice, and representing a further manifestation of selfishness in the world today, this race, in turn, brings into being terrifying world-wide interests linked to arms industries, multiplies the risk of a world conflagration, and provides fuel for the flames of conflict.

The arms race is not only fraught with the most terrible danger to human life; it also determines investment choices and sets a premium on economic structures which, having become essential to the life of nations, subsequently make it all the more difficult to carry out the conversion of the arms industry to non-military activities.

The countries whose high level of development enables them to influence the crippling economic and social process of the arms build-up have a special responsibility towards the international community and to the small and medium States which at present can do no more than submit to decisions which have been taken elsewhere, even though they involve their future.

For Unesco, the essential task is the creation of a growing movement of world public opinion which is conducive to disarmament and peaceful co-operation. One of our essential objectives should be to work towards the inclusion of education on disarmament in courses, not only at school and university, but wherever knowledge or skills are acquired.

What has to be done, above all, is to ensure that the burden implied by any war and the enormous benefits of peace are better understood so that public opinion can throw its full weight into the balance and can support governments in the movement towards disarmament.

We have to persuade and convince and appeal to reason and common sense, but we also have to call on people's generosity and a clearly realized sense of solidarity that stands to benefit one and all. It is a long drawn-out, difficult and at times unrewarding combat, for guns have to be silenced by ideas, but it is a combat on which all the world's hopes are staked. ■

Photo Boubat © Top, Paris

THE ARMS RACE

Military expenditure: the ever-rising tide

The Disarmament Decade solemnly declared by the United Nations in 1969 is drawing to an end. A number of international agreements and treaties on aspects of disarmament have been signed in the last ten years, but the fact remains that the arms race, far from slowing down, is actually gathering momentum, swallowing up vast material and human resources which are urgently needed for development and constituting a grave danger for world peace and security. The prospects for general and complete disarmament under effective international control seem as distant as ever.

To help alert world opinion to this problem of universal concern, the *Unesco Courier* presents in this issue long extracts from a United Nations report on "the economic and social consequences of the arms race and of military expenditures". The facts and figures revealed in this important document, produced in 1976 and 1977 by a group of experts from different world regions, draw attention to the dangers inherent in the present situation and stress the urgent need for resolute action to counter them.

The following experts took part in the preparation of the report:

Mr Gheorghe Dolgu, Chairman of the Group; Professor of Economics, President of the Academy of Economic Studies, Bucharest; **Mr. Simón Alberto Consalvi,** Permanent Representative of Venezuela to the United Nations, New York; **Mr. Hendrick de Haan,** Professor of International Economic Relations, University of Groningen, The Netherlands; **Mr. Dragomir Djokic,** Counsellor, Permanent Mission of Yugoslavia to the United Nations Office at Geneva; **Mr. Vasily S. Emelyanov,** Corresponding Member of the Academy of Sciences of the USSR; **Mr. Plácido García Reynoso,** Former Professor of Economics, National University of Mexico; **Mr. Saad M. Hashmi,** Deputy Permanent Representative of India to the United Nations, New York; **Mr. Ronald H. Huisken,** Visiting Fellow, Strategic and Defense Studies Centre, Australian National University; **Mr. Ladislav Matejka,** Deputy Minister, Presidium of the Government of the Czechoslovak Socialist Republic; **Mr. Akira Matsui,** Adviser, Ministry of Foreign Affairs, Japan; **Mr. Isaac M. Randolph,** Former Commissioner for Customs, Liberia; **Mr. Kurt W. Rothschild,** Professor of Economics, University of Linz, Austria; **Mr. Yves Ullmo,** Directeur des Synthèses à l'I.N.S.E.E. (Institut National de la Statistique et des Etudes Economiques), Paris.

FOR a number of years now the world has been diverting annually about $350 thousand million (1) to military purposes. The six leading countries in terms of military expenditure—the USA, the USSR, China, France, the U.K. and the Federal Republic of Germany—account for three fourths of this total. Altogether between five and six per cent of the world's total output of goods and services is diverted to military ends. In most countries the figure is between two and eight per cent, although in some cases it exceeds 30 per cent.

The rapid rise in military expenditure during the 1960s followed by a levelling off over the past eight years repeats a pattern which has been encountered several times before. Periods of massive military expansion, mostly in connexion with a war (the Second World War, Korea, Viet Nam) have alternated with plateaux lasting for some years.

The resulting impression that there are certain periods of relative stability is largely an illusion. In fact, the underlying trend for the great majority of countries is one of long-term irregular rise in military budgets, punctuated occasionally by modest and temporary decline. It is merely the overwhelming weight of a few leading countries in the total which gives the appearance of stepwise growth.

National arms inventories are not published, and for most types of armaments only highly tentative estimates of world stocks can be made. Nevertheless, some indications of a very general nature can be given.

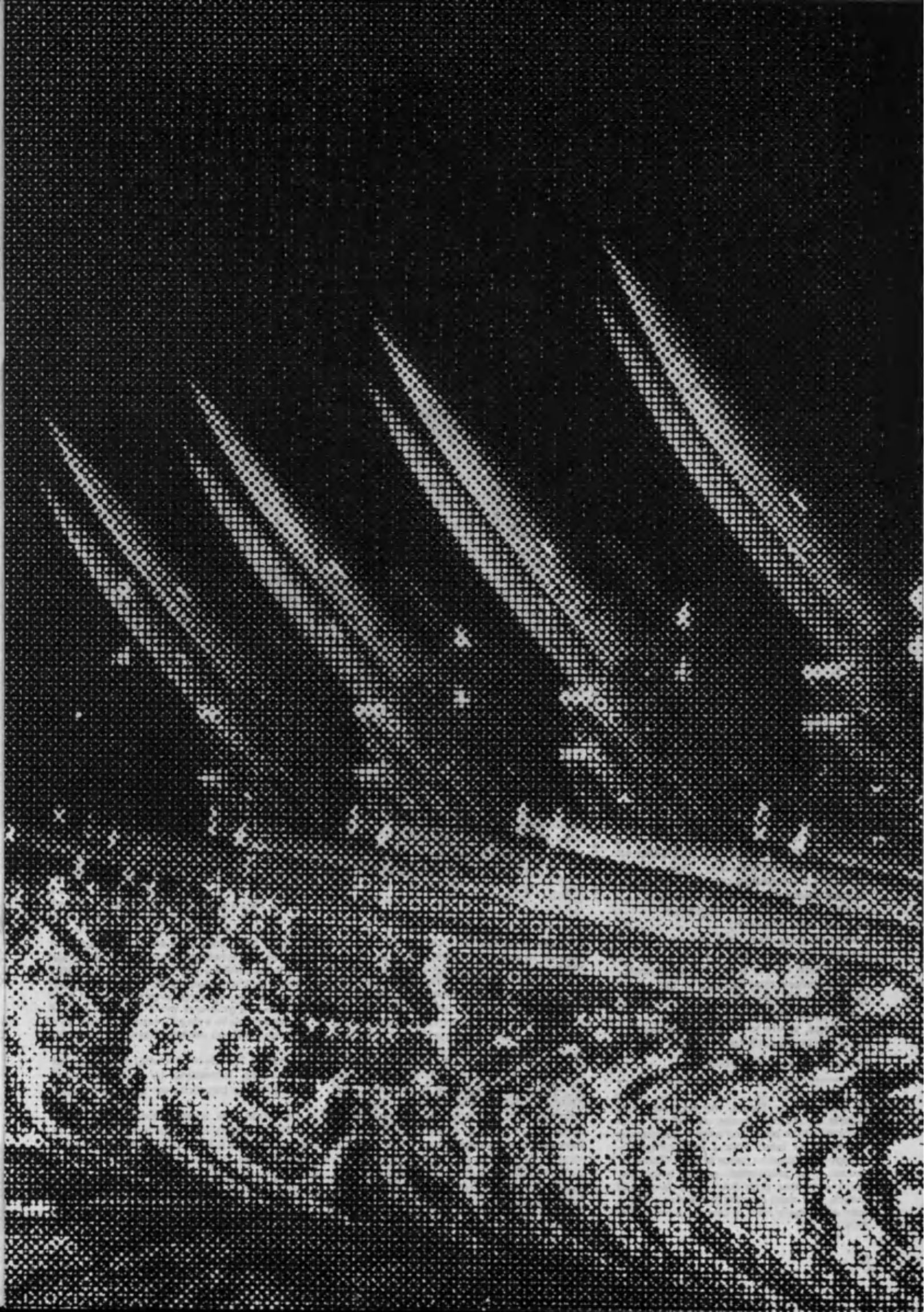
Current stocks of nuclear weapons are sufficient to destroy the world many times over. These weapons and the missiles, aircraft and artillery to deliver them are constantly being diversified and their performance improved. The number of nuclear warheads in arsenals is not known, but the number of carriers of different types is known with a fair degree of accuracy.

From these figures it can be inferred that in 1974 so-called "strategic" nuclear forces in the United States and the Soviet Union included between 10,000 and 11,000 thermonuclear warheads deliverable from missiles or bombers. This number has been rising very fast. Nuclear arsenals are also increasing in other States. Figures given by the Stockholm International Peace Research Institute (SIPRI) indicate that the number of missile-deliverable warheads possessed by the two major nuclear Powers more than tripled between 1970 and 1976, rising from about 3,700 to nearly 12,000. Their combined explosive power is believed to be equivalent to 1.3 million Hiroshima-size bombs.

With regard to so-called "tactical" nuclear weapons the situation is more uncertain. Their number is believed to be about four times larger than the number of

(1) Estimates of world military expenditure come mainly from the United States Arms Control and Disarmament Agency (ACDA) and the Stockholm International Peace Research Institute (SIPRI). The figures supplied by these two sources differ considerably in some cases, but not enough to affect conclusions substantially. ACDA figures are generally higher. Figures quoted in extracts from the UN report are those provided by SIPRI except where otherwise stated.

Photo Uzan © Gamma, Paris



"strategic" nuclear warheads, but their combined explosive power is but a fraction of the latter. According to one source it is equivalent to about 700 million tons of TNT or to some 50,000 Hiroshima-type bombs.

As for the major types of conventional weapons such as aircraft, fighting vessels and tanks, estimates have been made which provide a rough indication of trends. They indicate that the value of the world stock of fighting ships (in constant dollars) doubled between 1960 and 1970 and rose by a further 30 per cent between 1970 and 1976. This pattern appears to be valid for several other types of armaments as well; world stocks reckoned in numbers have remained fairly constant, but in terms of cost and performance they are increasing very rapidly, and, in the 1970s in particular, current models have been spreading very fast to an increasing number of countries.

This is true of modern aircraft. Only 13 developing countries had supersonic aircraft in 1965. A decade later the number had risen to 41. Over the past 30 years a few major arms-producing countries together developed and procured over 70 types of intercepters, fighter and attack aircraft and twice as many variants of these types. Even after correction for inflation, the unit price of fighter aircraft has been doubling every four or five years, rising from about $250,000 per aircraft (1975 prices) during the Second World War to well over $10 million today, reflecting improvements in performance and armament.

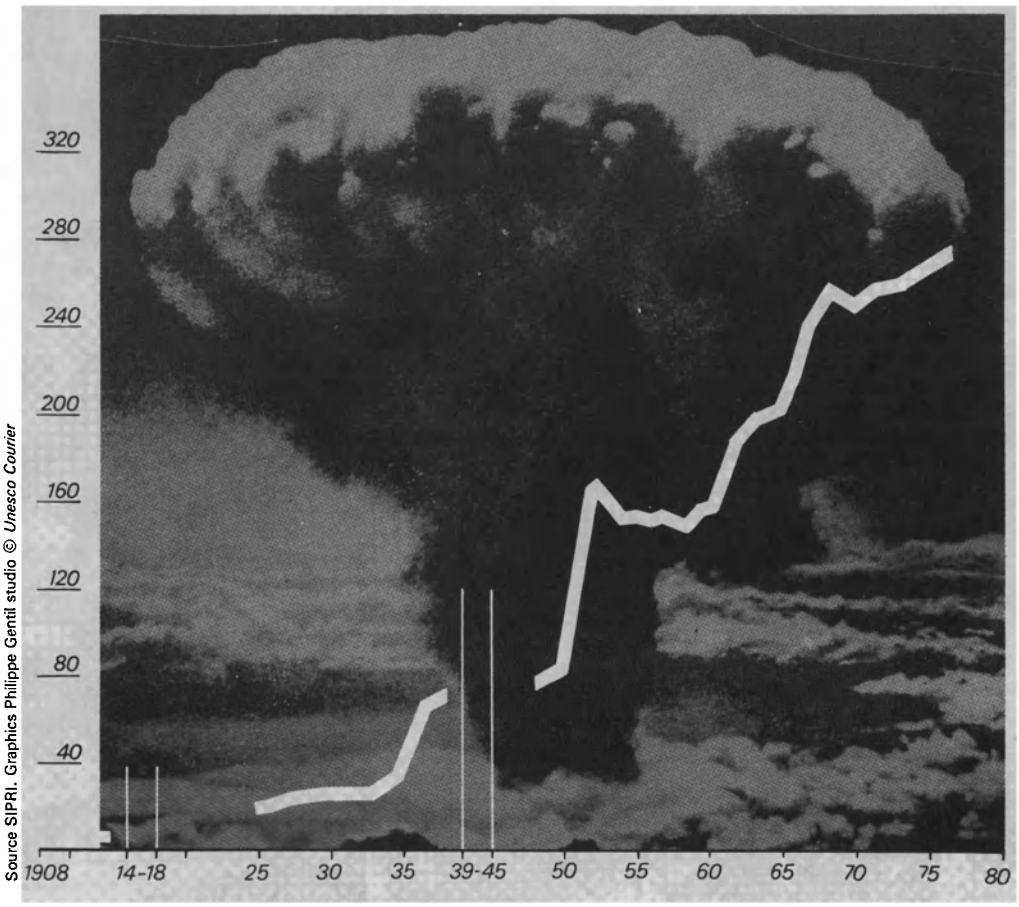
The six major military spenders not only account for three-quarters of world military spending, but for practically all military research and development (R and D) and for practically all exports of weapons and military equipment. All significant developments in armaments originate in these countries and spread from them to the rest of the world.

The total value of transfers of military goods and services cannot be determined with accuracy, although several institutions now publish counts and estimates of arms transfers on a regular basis. The United States Arms Control and Disarmament Agency, which gives the most comprehensive figures, estimates the total value of goods actually delivered in 1975 at $9.7 thousand million in current prices. This excludes training services and construction which, if figures for the United States are a valid guide, would add another 30 per cent to the total, raising the figure for the value of military goods and services transferred world-wide in 1975 to an estimated $13 thousand million.

About one third of the total is traded among industrialized countries; another third, approximately, is made up of exports to oil-exporting developing countries, mainly in the Middle East, and the remaining third goes to all other developing countries together. The total value of arms transfers has been growing steadily over the years, increasing by a minimum of three to four per cent over the past decade.

Despite this appearance of continuity, very important changes in the pattern of arms transfers have in fact taken place in this period.

First there has been a rapid rise in the export of major weapons to a number of developing countries and in some cases these are increasingly highly sophisticated



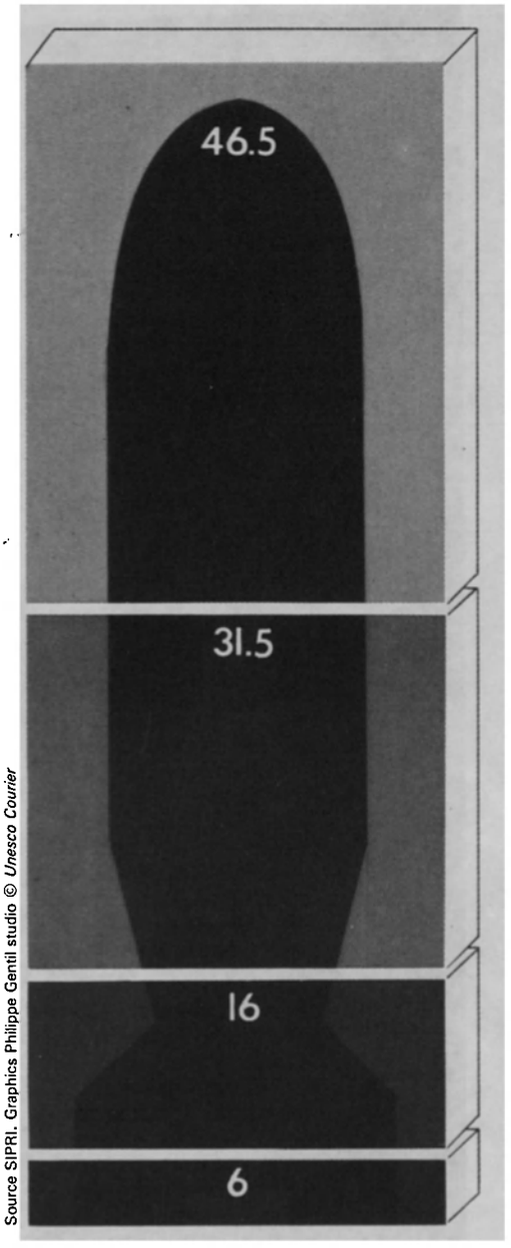
Source SIPRI. Graphics Philippe Gentil studio © *Unesco Courier*

WORLD MILITARY EXPENDITURE, 1908-1977 ***(constant 1973 prices) US $ thousand million***
Already in this century 60 million persons have died in two world wars and since 1945 over 100 regional conflicts have also claimed millions of lives. Military expenditure has steadily risen. Since the Second World War the direct costs of the arms race have exceeded $6,000 thousand million (in 1975 prices), almost as much as the aggregate GNP of the entire world in 1975.

The war-drums are sounded.
Men force their features into
frightfulness and gnash their teeth;
and before they rush out to gather
raw human flesh for death's larder,
they march to the temple of Buddha,
the compassionate,
to claim his blessings,
while loud beats the drum rat-a-tat
and earth trembles...
They will punctuate each thousand of
the maimed and killed
with the trumpeting of their triumph,
arouse demon's mirth at the sight
of the limbs torn bleeding from
women and children;
and they pray that they may befog
minds with untruths
and poison God's sweet air of breath,
and therefore they march to the
temple of Buddha, the
compassionate, to claim his
blessings, while loud beats the drum
rat-a-tat and earth trembles.

Rabindranath Tagore (1861-1941)

■ *This poem by Tagore, the quotation from Voltaire on the back cover, and all the other quotations from poets and writers appearing in this issue are taken from a forthcoming anthology of writings on peace to be published by Unesco. The preparation of the anthology, which comprises texts from many lands and periods, was made possible by the award of the John XXIII Peace Prize to Unesco in November 1974.*



Source SIPRI. Graphics Philippe Gentil studio © *Unesco Courier*

WORLD MILITARY EXPENDITURE IN 1976
Drawing shows breakdown by groups of countries of world military expenditure in 1976. The two major world powers accounted for almost half (46.5 per cent) of the total, the three other permanent members of the United Nations Security Council 16 per cent. A group of 33 countries spending over $1,000 million each per annum provided 31.5 per cent of the world figure, while the remaining 6 per cent came from the rest of the world. Half of what is spent on military purposes every day would be enough to fund the World Health Organization's programme to eradicate malaria, a disease which is endemic in 66 developing countries whose total population is over one thousand million. World military spending in a single year would finance 25 years of economic aid to developing countries (at 1978 rates).

weapons. According to SIPRI estimates, exports of major weapons to developing countries rose from $3 thousand million in 1970 to $6.3 thousand million in 1975 and $7.3 thousand million in 1976.

Second, there has been a major shift towards transactions on commercial or near-commercial terms. For most suppliers commercial considerations have become predominant to an unprecedented degree and the only remaining constraint appears to be the resources recipients are able and willing to commit to the purchase of armaments.

The arms trade affects the economies of importing and exporting countries in diametrically opposite ways. It is a highly unequal exchange which is detrimental to efforts to bridge the gap between poor and rich countries. For the importer it is purely and simply a waste of economic resources which could have been used productively. Even when weapons are provided as gifts, operation and infrastructure costs must be included on the debit side. In contrast to the import of non-military goods these outlays raise neither consumption nor production and generate no future output from which to pay for them.

Not so for the exporting country. That part of its arms production which is destined for its own armed forces constitutes, at first approximation, an economic loss. But its production of weapons for export is no different in economic terms from any other export production. In some cases it may be in fact more advantageous than other kinds of export because the advanced-technology component in arms exports is particularly high.

These exports therefore tend to stimulate important sectors of the economy of the exporting country, such as mechanical engineering, electronics and the industries supplying these sectors. Recent arms deals involving highly sophisticated equipment have enhanced these tendencies since the price of such equipment often includes a large component to cover research and development costs. In addition to orders for existing weapons, some recent contracts have even involved the development of new or improved weapons systems specially for export to the contractor. In this way importing countries are subsidizing military research and development in the arms exporting countries. This also applies when, instead of importing weapons, countries produce them under licence.

In most cases this subsidy is of marginal importance for the exporting country but in some instances the viability of certain national arms industries or of particular companies is significantly affected. In a very real, although often marginal, way importing countries are thus helping to perpetuate the lead in military technology of the main arms exporting countries and to sustain the rate of innovation and obsolescence in weaponry.

In addition to the growing volume of arms transfers, various forms of international co-operation in arms production are gaining importance. In the industrialized countries the tendency is toward co-production, several countries pooling facilities to produce different components for a particularly costly and sophisticated weapons system, and, less frequently, collaboration (and cost-sharing) in design and development.

In the developing countries the usual pattern is to establish local maintenance facilities and then gradually to take charge of repairs, the assembly of imported components, local production of certain components, and so on. More recently, some countries have been able to accelerate this process by purchasing complete production facilities, with the foreign contractor, whether it be a firm or a government, providing the whole system—design, plant, know-how and some of the parts of the finished weapon.

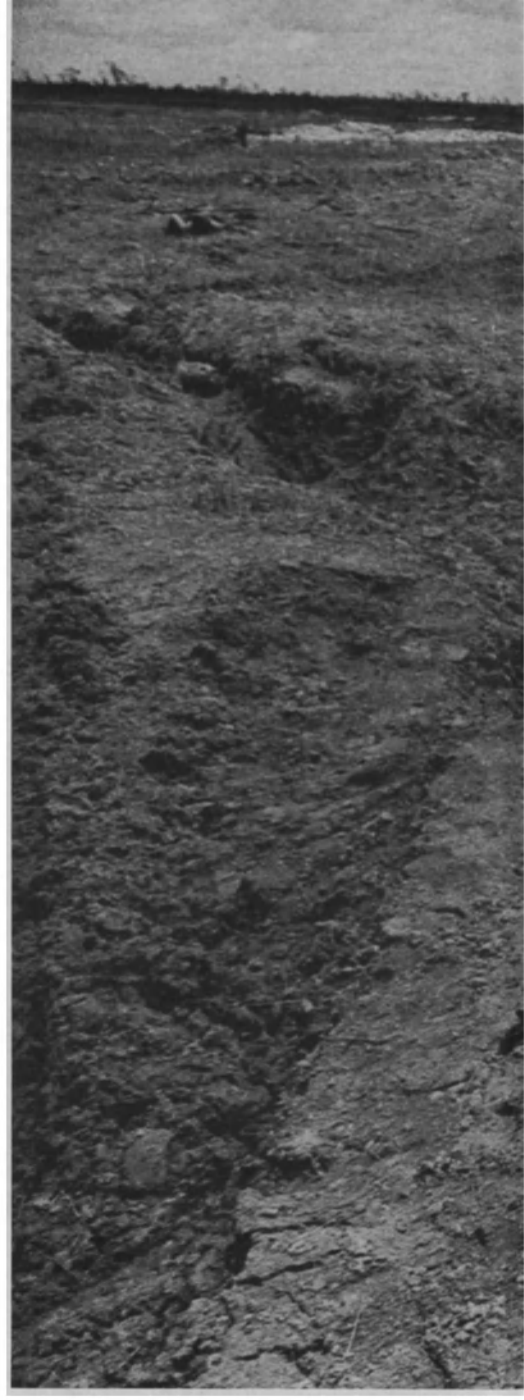
Seen from a social and political angle, something extremely important and radically new is involved here. In some cases, it could be the beginning of a process whereby the military-industrial complexes of the supplying countries expand beyond their own borders, take root abroad and reproduce the whole network of relations between industry, producers and sub-contractors, unions, government and armed forces in the new environment.

With the transfer of complete and operational weapons systems and the provision of military advisers, as with other forms of military co-operation, relations between recipient and supplier tend to remain confined to the armed forces. But in the types of multilateral production or dependent domestic production considered here, a whole set of mutually supportive relations and of vested interests in the perpetuation of the armaments process is built up and spreads through society, far beyond the military establishment proper.

While it is not likely, even in the long run, to provide any genuine independence from the main arms producing countries, the multinational expansion of military-industrial complexes could in time become a significant impediment to effective arms limitation and disarmament in the regions where it is taking place. This underlines once more the urgency of achieving progress towards disarmament. The size and complexity of the problems will only increase with the passage of time.■

THE ARMS RACE

New technologies for overkill



THE most important and spectacular aspect of the arms race in the 1960s was the development and the full-scale deployment of intercontinental ballistic missiles (ICBMs), of submarine-launched missiles (SLBMs), and of the associated satellite surveillance and communication systems.

By the end of that decade there was widespread concern that a new arms-race spiral might result from the development of anti-ballistic missile systems (ABMs) and measures taken to counter them. These involved increasing the number of launchers and, with the development of multiple and independently targetable re-entry vehicles (MIRVs), increasing the number of warheads per launcher with a view to neutralizing the ABM systems by saturating them.

The first strategic arms limitation treaty (SALT I) between the United States and the Soviet Union which was signed in May 1972, set ceilings on the number of ABM sites and ICBM and SLBM launchers and succeeded in halting the deployment of ABM systems. Since 1972 the number of launchers has been increasing and is approaching the agreed ceilings. In 1976, in round figures, 2,500 ICBMs and 1,400 SLBMs were held by these two Powers together.

The SALT agreement has had positive effects but it is important not to lose sight of its serious inadequacies with regard to the limitation of strategic arms. Thus in recent years the arms race in strategic nuclear weapons has increasingly taken a qualitative direction. Vigorous research and development programmes on improved ABM systems have been maintained.

The SALT agreement as a whole has had no discernible impact on the extent of MIRV deployment. As a result, the number of ICBM and SLBM deliverable nuclear warheads has been rising by about 1,000 every year.

Moreover, a major post-MIRV innovation is already at an advanced stage of development. This is a manœuvrable re-entry vehicle (MARV) which can change direction in the terminal stages of its trajectory. This could not only make defence against ballistic missile attack more difficult, but also, if combined with developments now taking place in terminal guidance systems, could provide MARVed missiles with pinpoint accuracy of a few tens of metres instead of the current accuracy of somewhat less than one kilometre. This means that the silos now protecting land-based ICBMs can be destroyed with near certainty with a single warhead at the first attempt.

As a result it becomes possible to consider using "strategic" nuclear weapons in new ways. In addition to being a means of massive reprisals against centres of population and industry to serve as a basic deterrent, it becomes possible to think of using ballistic missiles in "counter-force" roles to gain military advantage at the outset of a war by striking at the weapons and military installations of the opponent, or to use them to conduct supposedly "limited" nuclear war. The adoption of doctrines of this kind could greatly enhance the probability of nuclear war.

No less significant are the implications of the deployment of long-range cruise missiles. These weapons, now under development, are best described as small, highly manœuvrable, low-flying pilotless aircraft. They can be equipped with a nuclear as well as a conventional warhead.

Current models have ranges of several thousand kilometres and accurate guidance systems, which readjust the trajectory at intervals by comparing terrain features with a map. Accuracy is therefore independent of range. It will be impossible to determine from its geometry alone whether a cruise missile carries a nuclear or a conventional warhead and, within wide limits, what its range is. Moreover, it is a small and easily concealed vehicle. Future agreements on strategic weapons may thus become very difficult to negotiate because they will be difficult to verify.

The cost of the cruise missile will be at least an order of magnitude less than that of ICBMs, so that in the years to come it will be well within the financial means of the smaller nuclear powers and of many other countries as well. For some time the exorbitant cost of the latest types of nuclear weapon carriers (ICBMs and SLBMs) has helped maintain the two main military Powers in a class by themselves. In the foreseeable future the importance of this factor may greatly diminish.

Developments in the technology of nuclear weapons themselves are equally ominous, particularly the development of small, low-yield nuclear weapons and enhanced radiation weapons and of tactical concepts for their use in battle. Delivered with higher accuracy and causing less collateral damage per warhead, their use on the battlefield may seem more acceptable, so that the step from non-nuclear to nuclear war may be more readily taken. Once they are used on the battlefield, escalation towards full-scale nuclear war becomes a dangerous possibility.

The aggregate effect of these developments cannot be understood in terms of the gradual improvements in performance which have been so common since the 1960s that they are hardly news any more. The importance of the changes now underway in the field of nuclear armaments and their carriers is not that their

Photo Henri Bureau © Gamma, Paris

performance in missions traditionally assigned to them is improving year by year, but that essentially new types of missions are becoming possible. New technologies open the way for new doctrines. These in turn give an appearance of rationality to the deployment of weaponry embodying these technologies. At the same time they increase the dangers of war and alter the terms of the disarmament equation, rendering it more complex and more intractable.

The proliferation of nuclear technologies continues at an accelerating pace. France and China acquired nuclear weapon capability in the 1960s, and, in 1974, India, which is not a party to the Non-Proliferation Treaty [an agreement of 1 July 1968, signed by the U.K., the U.S.A., the U.S.S.R. and a number of other States, under which the three major signatories agreed not to assist non-nuclear weapon States in obtaining or producing nuclear explosives], conducted a nuclear explosion experiment underground. It was officially termed a peaceful nuclear explosion experiment, but it demonstrated how readily and cheaply a small nuclear weapon capability could be derived from a major civilian nuclear programme. In other cases nuclear weapon capability could have been acquired without being demonstrated in a nuclear explosion.

Civilian nuclear programmes, and with them the technical expertise and the fissile material required for military programmes have spread all over the world during the 1970s. In 1975, nineteen countries had nuclear power plants in operation and another ten countries will have them by 1980. Experimental reactors are now in operation in well over 50 countries. As far as most industrialized and several developing countries are concerned, there are no longer serious technological or economic barriers against initiating a nuclear weapons programme. The only barriers to proliferation are now political—obligations assumed under the Non-Proliferation Treaty, the good sense of governments and the example to be set in the coming years by the nuclear weapons Powers in agreeing to reduce their own nuclear arsenals.

It is, of course, the continuation of the nuclear arms race, not merely the spread of peaceful uses of nuclear energy, which endangers peace. Stocks of nuclear weapons and the continuation of the nuclear arms race are factors which encourage nuclear weapons proliferation. The danger of the proliferation of nuclear weapons can be removed by outlawing and halting the production of such weapons and by destroying existing stocks.

The resolutions of the United Nations General Assembly have repeatedly emphasized that the Non-Proliferation Treaty should become universal. It is consequently important that the system of control envisaged in article III of the Non-Proliferation Treaty be adopted and that the parties to the Treaty conclude the safeguards agreements with the International Atomic Energy Agency envisaged in article III of the Treaty.

Developments in the military use of

space have been overshadowed in the public mind by civilian space exploits. Yet they have been of decisive importance. In the Indo-China war satellites were used for communication, for weather forecasting prior to bombing raids and for navigation for naval bombardment, but only now are the full potentialities of these means materializing.

Satellite technology is having a decisive impact and conferring substantial superiority on the major military Powers in at least three fields—target identification, navigation and damage assessment in connexion with counter-force strategies in nuclear warfare; surveillance, target identification and navigation in "conventional warfare"; and world-wide intelligence and surveillance of the military programmes of other countries and of wars in which the major Powers are not directly involved.

The consequences of this latter capability could be both positive and negative verification of agreements on arms limitations or disengagement, on the one hand, and area policing and assistance in aggression, on the other.

To cite an American example, because these are the best known, the NAVSTAR programme provides an indication of what is becoming possible in just one field. NAVSTAR is a 24-satellite system which can provide three-dimensional positioning throughout the world to within about ten metres. Among its many possible uses is the guidance of both nuclear and non-nuclear forces in so-called "strategic" roles and on the battlefield. It is to be established over the period 1977-1984 at a cost in the $3,000 million range. Not only will it allow perfectly accurate guidance of ballistic missiles against fixed targets, an essential component of the counter-force strategy already mentioned, it is also likely to enhance greatly the effectiveness of sea, ground and air forces in conventional warfare and local wars.

Nevertheless, some progress has been made and the installation of nuclear weapons or any other kinds of weapons of mass destruction in space is prohibited under the Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and other Celestial Bodies.

Throughout the 1960s conventional weapons systems underwent continual and rapid refinement in terms of size, speed, propulsion, fire power, accuracy and so forth. Unit costs for major weapons systems typically doubled in real terms during this period. For aircraft they doubled about twice as fast.

Sophisticated weaponry, including supersonic aircraft, became commonplace in the armouries of industrialized as well as less developed countries. And these developments have continued unabated. In addition, technological advances in several areas have been combined to produce new types of conventional weapons with potentially far-reaching military and political implications.

New precision-guided munitions (PGMs), remotely-piloted vehicles (RPVs) and other devices have been developed to carry a conventional warhead to its target with very great accuracy or, in the case of RPVs, for reconnaissance and similar missions.

This group of weapons uses the latest developments in such fields as laser technology, microelectronics, electromagnetic sensors in the radar, infrared and optical ranges, and wide-band data links for a variety of remote or automatic guidance and/or homing devices.

A first generation of PGMs made their appearance in the Indo-China war. In the Middle East in 1973, the enormous potential of such weapons against tanks and aircraft was demonstrated. Both the type of technology involved and their cost make PGMs accessible to many countries and, indeed, many already have them in their inventories.

Such precision munitions are expected to have battlefield implications as far-reaching as anything that has happened since the Second World War. The design and mission assignment of the classical weapons carriers, aircraft, ships and tanks, and even the preponderant place they have had hitherto in contemporary armouries may be radically changed.

The new weapons, together with developments in such areas as night vision devices, battlefield surveillance and communications, are likely to accelerate the pace of modern warfare and to place a still higher premium on standing military forces.

Last but not least, with dramatic improvements in accuracy the yield of the explosive charge becomes a less important parameter in performance. There have been suggestions, for example, that some of the missions now assigned to "tactical" nuclear weapons could be performed by precision-delivered weapons with a conventional warhead. In principle this could

Photo John Freeman Group © British Museum, London

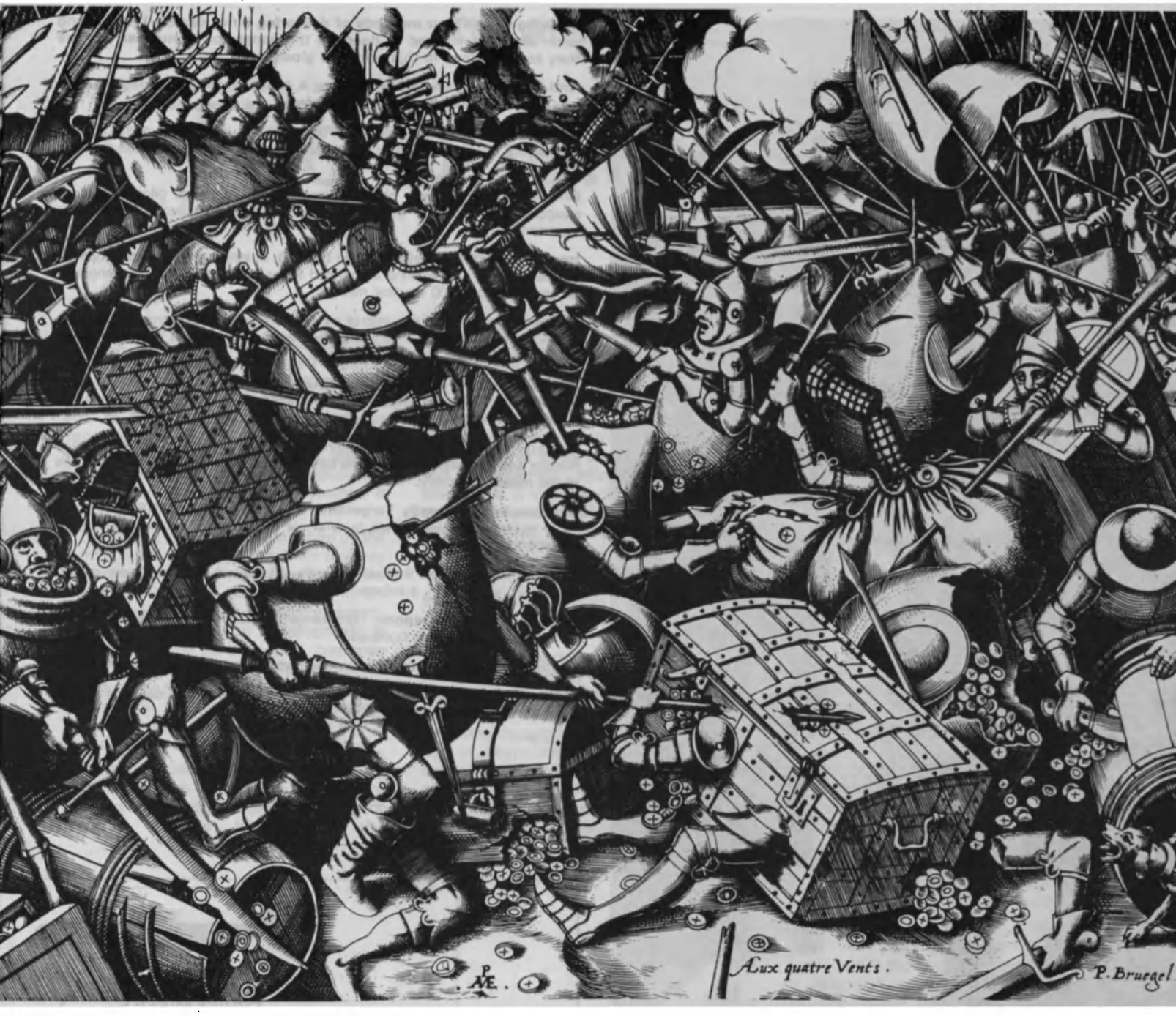
THE FIGHT OF THE MONEYBAGS, a print by *Pieter Brueghel the Elder* (1525-1569?). Dating from 1564, the work is now in the British Museum, London.

Since you set out for the south-east,
Who knows in what land you are fighting now?
The fate of men who go away to war
Is no heavier than meadow-grass or herbs.

Ghosts of dead men-at-arms, deep sound of the great wind,
Warriors' masks, cold glimmering of moons,
Soldiers and fighting men, laid out now in silence,
Who will colour your features, or call back your departed souls?

War leaves its traces, yet nature remains unchanged,
The heart of the passer-by bleeds with the pity of it all...
Man's destiny is to grow old on battlefields:
Ban Siéu's hair was powdered with hoar-frost before he returned.

Dang Tran Con and Phan Huy Ich (18th century)
Song of the Soldier's Wife



mean that the military planners would be more willing to dispense with the use of nuclear weapons in a limited conflict, but in practice it could equally well have the effect of blurring the distinction between the use of nuclear and non-nuclear weapons, thus enhancing the risk of any armed conflict developing into nuclear war.

A range of new weapons and munitions based on blast, fragmentation and incendiary effects has been developed, and was used, notably during the Indo-China war, for saturation bombing over large areas. Such carpet-bombing techniques approach nuclear weapons as regards the blind, indiscriminate destruction they cause, the long-term ecological effects to which they give rise, and the high proportion of wounded and maimed among casualties.

Other weapons of massive and indiscriminate destruction have not lagged behind. The effectiveness of incendiary weapons has been considerably increased, and the development of binary nerve gases and their munitions (which are relatively innocuous to handle as the nerve gas is only assembled in flight) could seriously weaken the remaining technical and operational constraints on the development of chemical weapons.

Significant developments have also taken place in many other fields such as radar technology, anti-submarine warfare techniques, low-altitude intercepter aircraft and laser-guided cannon. ■

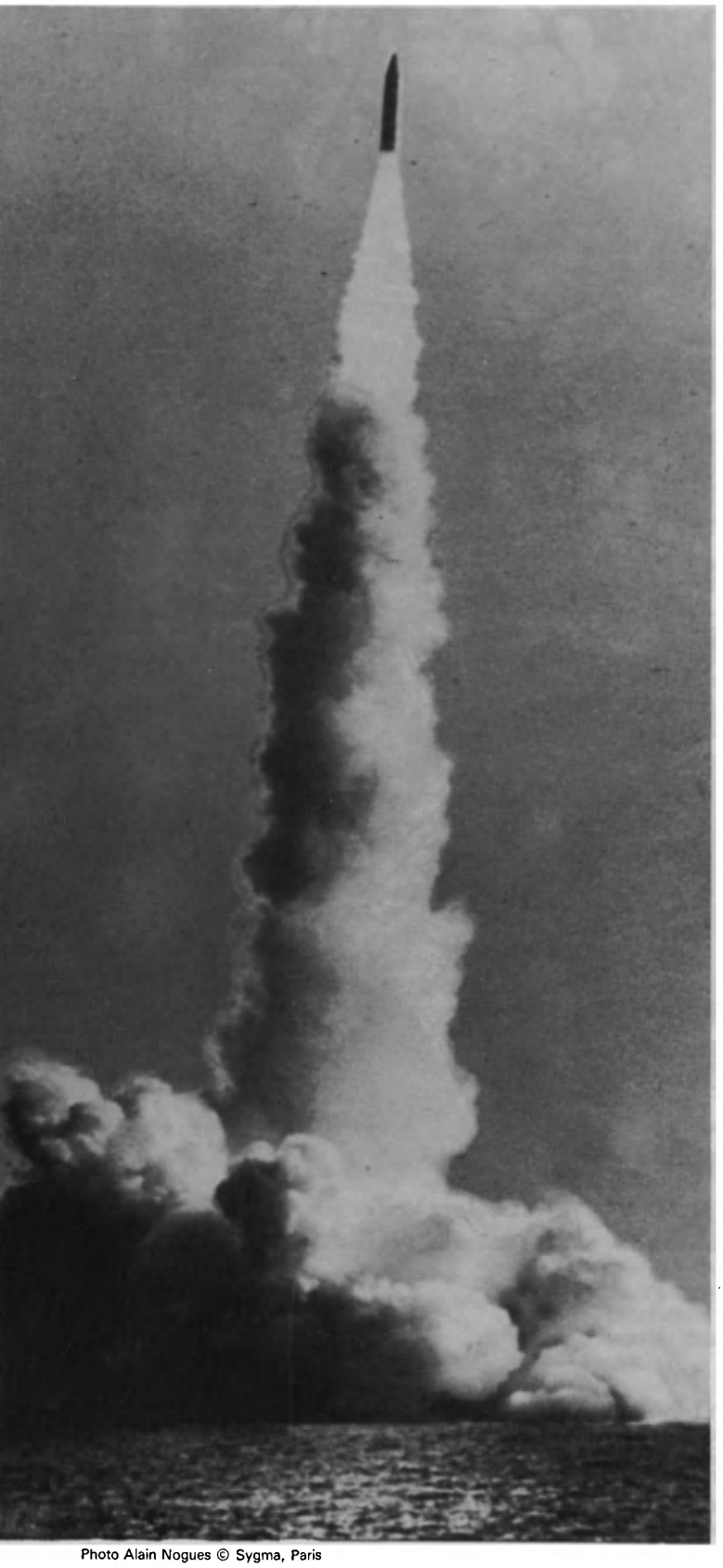


Photo Alain Nogues © Sygma, Paris

Drawing shows four methods of delivering a nuclear warhead. Along with other terms used to describe the apparatus of nuclear warfare they are explained in this selective glossary.

Anti-Ballistic Missile (ABM) system: A system to counter strategic ballistic missiles or their elements in flight trajectory.

Ballistic missile: Any missile which does not rely upon aerodynamic surface to produce lift and consequently follows a ballistic trajectory when thrust is terminated.

Cruise Missile: a small, highly-manœuvrable, low-flying, pilotless aircraft equipped with accurate guidance systems which periodically readjust the trajectory.

Intercontinental Ballistic Missile (ICBM): A land-based, rocket-propelled vehicle capable of delivering a warhead to intercontinental ranges (ranges in excess of about 3,000 nautical miles).

Kiloton: A measure of the yield of a nuclear weapon equivalent to 1,000 tons of TNT (trinitrotoluene). The bomb detonated at Hiroshima in World War II had an approximate yield of 14 kilotons.

Manœuvrable Re-entry Vehicle (MARV): A ballistic missile re-entry vehicle equipped with its own navigation and control systems capable of adjusting its trajectory during re-entry into the atmosphere.

Re-entry Vehicle (RV): That portion of a ballistic missile designed to carry a nuclear warhead and to re-enter the Earth's atmosphere in the terminal portion of the missile trajectory.

Multiple Independently Targetable Re-entry Vehicle (MIRV): Two or more re-entry vehicles carried by a single missile and capable of being independently targeted.

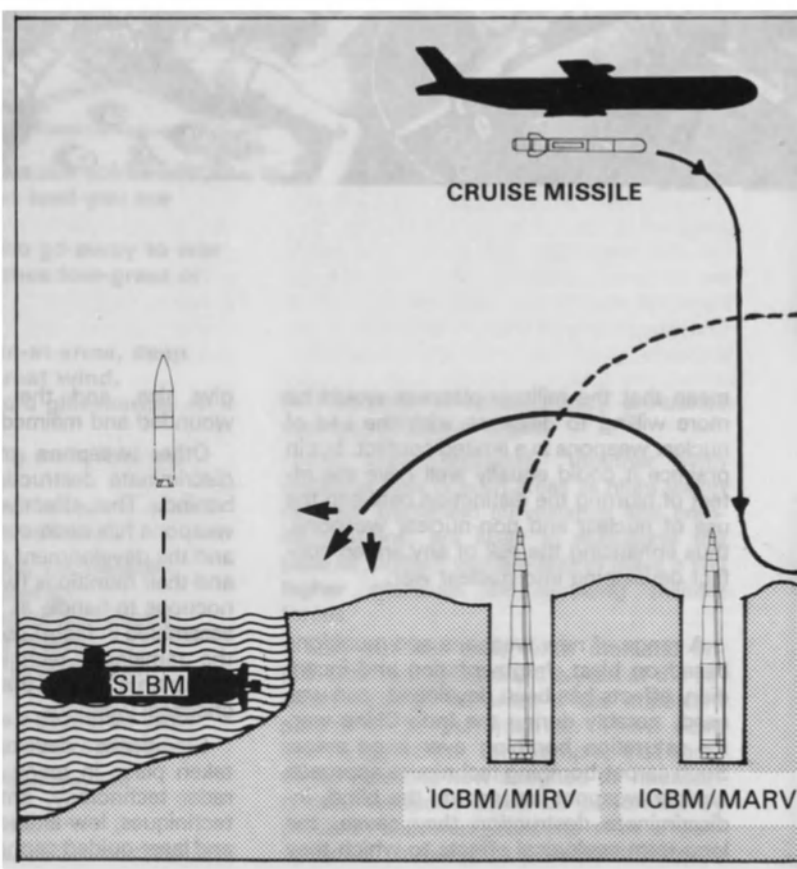
Submarine-Launched Ballistic Missile (SLBM): A ballistic missile carried in, and launched from, a submarine.

Strategic nuclear weapons: Long-range weapons carried on either ICBMs or SLBMs or long-range bombers.

Tactical nuclear weapons: Short-range weapons carried on smaller missiles.

Warhead: That part of a missile, projectile, or torpedo that contains the explosive intended to inflict damage.

Source SIPRI



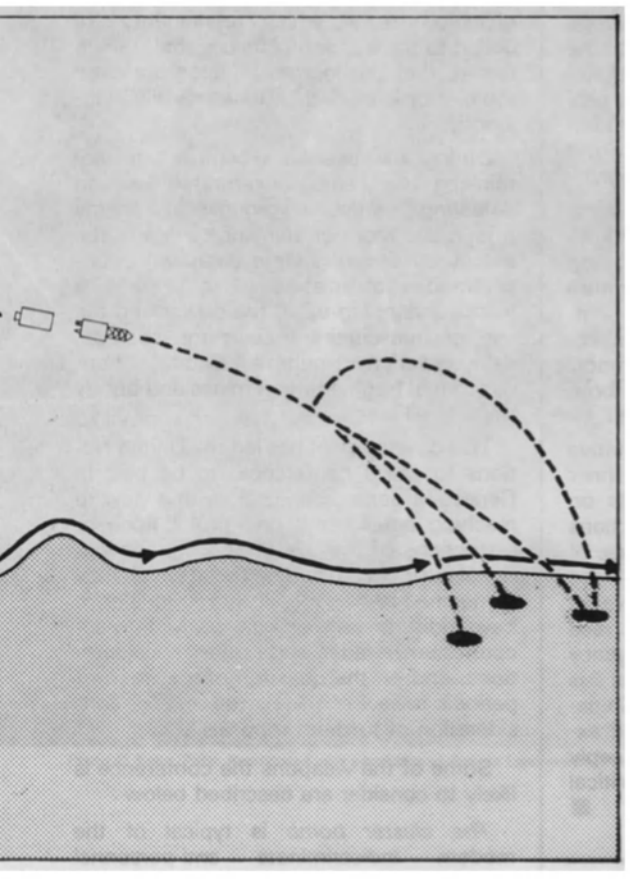
The quality spiral

THE competition in armaments between the largest military Powers is even more intense than is suggested by the immense size and the rapid expansion of their arsenals, because it takes place primarily in a qualitative rather than a quantitative dimension, each new generation of weapons being more complex and more destructive than the systems it replaces.

The strong qualitative momentum of the current arms race influences both the way it develops, the insecurity it generates and the possibilities for disarmament. In an arms race where the emphasis is on quantity, where technological development is slow and of little consequence, countries may be expected to match their armament efforts to the stocks or the growth rates of the military forces of their opponents. There is room for saturation levels or for mutually agreed ceilings and reductions.

Under conditions of rapid military innovation, on the other hand, the decisive factor in the military procurement plans of countries at the forefront of the technological arms race is not so much the actual military strength of their opponents but rather those technological advances which opponents might be able to achieve over the next decade or so. Inevitably, as the apprehensions of military planners shift from the force levels towards the research and development efforts of their opponents, it is increasingly on the research and development efforts of their own country, which are known, that they will have to base their plans.

In an arms race where the stress is on technological advances the process of weapon and counter-weapon development therefore tends to become in some measure an intra-national process, in some cases only marginally related to the stages actually reached by other countries. Each country is actively seeking means of defeating its own most advanced weapons and of neutralizing its own most recent defences, thus conferring on the development of military technology a momentum and a rate of obsolescence much greater than in comparable civilian applications.



Graphics Philippe Gentil studio © *Unesco Courier*

A qualitative arms race with its long lead time and its emphasis on future possibilities rather than current realities tends to move in one direction only: one country's advances in weaponry will be emulated by others, but its self-restraint need not be. Similarly an increase in international tension may accelerate the arms race, but an improvement of the international climate will not necessarily suffice to slow it down.

In advanced military technology, the achievement of exacting technical specifications and early delivery schedules tends to take precedence over cost considerations when new weapons are being designed. The large cost-overruns which have become an almost normal feature of advanced military projects illustrate this fact. The result is an increasing volume of research and development with each new generation of weapons.

For example it is estimated that the amount of draughtsmanship required for the design of a military aircraft today is typically of the order of 4,000 man-years, spread over a seven to ten-year period. This may be compared with about 170 man-years spread over two to three years required for the design of the Halifax bomber on the eve of the Second World War.

For many years now rising research and development requirements have been met by expanding staff rather than lengthening the design cycle to prevent weapons from becoming obsolete before they entered into service. This trend which is inherent in a qualitative arms race cannot fail to create problems of surplus capacity both in design and in production unless military procurement expands for every new generation of weapons.

Continuous employment is only compatible with rapid development and design if production cycles are short and military stocks are replaced at a rapid rate. The abandonment of many advanced weapons programmes before production started but after hundreds of millions of dollars had been spent on development, again a recurrent feature of the past decades, has of course helped to alleviate somewhat this problem of surplus capacity.

Even disregarding the inherently wasteful character of weapons themselves, arms production under the conditions of a qualitative arms race appears as an exceptionally wasteful process, whether the waste takes the form of project cancellations half-way through, of intermittent underemployment or of military arsenals

THE QUALITY SPIRAL

which are allowed to expand for industrial rather than military reasons.

In an arms race so consistently bent on qualitative improvements and the quest for achieving or pre-empting technological breakthroughs, a mere examination of trends in military expenditure gives a wrong impression of the true rise in destructive potential.

In civilian production it is a well-known proposition that under conditions of continuous technical progress even a policy of zero net-investment will lead to a constantly increasing output. Worn-out machines are replaced by machines incorporating a more advanced technology and this results in higher productivity.

The same applies to military expenditure. Even if it does not rise in real terms, the devotion of a large proportion to research and development and to qualitative improvement means that the destructiveness and the potential danger of the military apparatus continues to grow.

Thus it is necessary to distinguish between the economic and the military consequences of armaments expenditure. They bear no necessary relationship to one another: a rise in the (real) volume of military expenditure will almost always imply an increase in lethality and destructive power. But when such expenditure is reduced there may well be a divergent movement: a certain relaxation of the overall economic burden can be accompanied by a further extension of destructive power, as indeed we are witnessing today in some countries.

However, since concentration on the qualitative (i.e. technological) arms race requires a high input of specially scarce qualified manpower (scientists, technicians, management, highly-skilled workers), shifts towards greater emphasis on rapid qualitative change can be economically harmful, even when they are accompanied by a reduction in total military expenditure.

The facts about the qualitative character of the arms race—alarming and growing in importance—have to be kept in mind when measures against a continuation of the arms race are discussed. It will not suffice to take cuts in total military expenditure as the sole criterion of progress unless they are very substantial indeed.

One form of progress consists in setting limits on special weapons and weapon systems. The ABM (Anti-Ballistic Missile) Agreement between the United States and the USSR or the Biological Disarmament Convention are cases in point. Similar steps covering wider ranges of weapons and modes of warfare, nuclear and chemical means of warfare in particular, would help to erect important boundaries for the arms race.

To be most effective these measures should be directed at new developments, that is before any significant research and development work has been done and before the projects acquire a political, institutional and industrial momentum.

There is also a case for seeking prohibition of the development and manufacture of new types and systems of weapons of mass destruction as called for in several resolutions of the General Assembly of the United Nations. Such action must be closely linked to firm measures to halt the production of nuclear weapons, the liquidation of existing stockpiles and the complete and definitive prohibition of nuclear weapons.

A decisive attack on the qualitative arms race would also be achieved if an agreement could be reached among the leading military powers to cut down expenditure on military research and development. Such a measure could also—after redirecting the released resources—lead to important economic and social benefits to both the developed and developing nations.

The commitment to incessant qualitative change is deeply embedded in the inner logic of the arms race. Agreements on qualitative and technological restrictions are not easily reached, not least because of difficult verification problems. But if the difficulties of securing some measure of control over this aspect of the arms race are particularly great, so too is the urgency of the need to take determined steps in this direction. Each passing year sees the initiation of a spate of new weapons, and existing programmes become more deeply entrenched in the military and political systems of countries. ■

UNDER the constant, brooding menace of the nuclear bomb, the ultimate weapon of mass destruction, it is all too easy to discount the importance of conventional anti-personnel weapons intended primarily to kill or maim individual human beings.

For some 250,000 years—by the middle of the Pleistocene Epoch our ancestors were fashioning crude arms for use against beasts and their fellow men—the history of these weapons has been the history of a progression of invention, improvement and refinement of such fertile evil genius as to make one wonder whether the human brain is not the deadliest weapon of them all.

There is a stage in the life of almost every weapon as it progresses from invention to obsolescence at which refinements are added to the weapon or its projectile which ensure that the injuries inflicted are even more horrible and "unnecessarily" injurious.

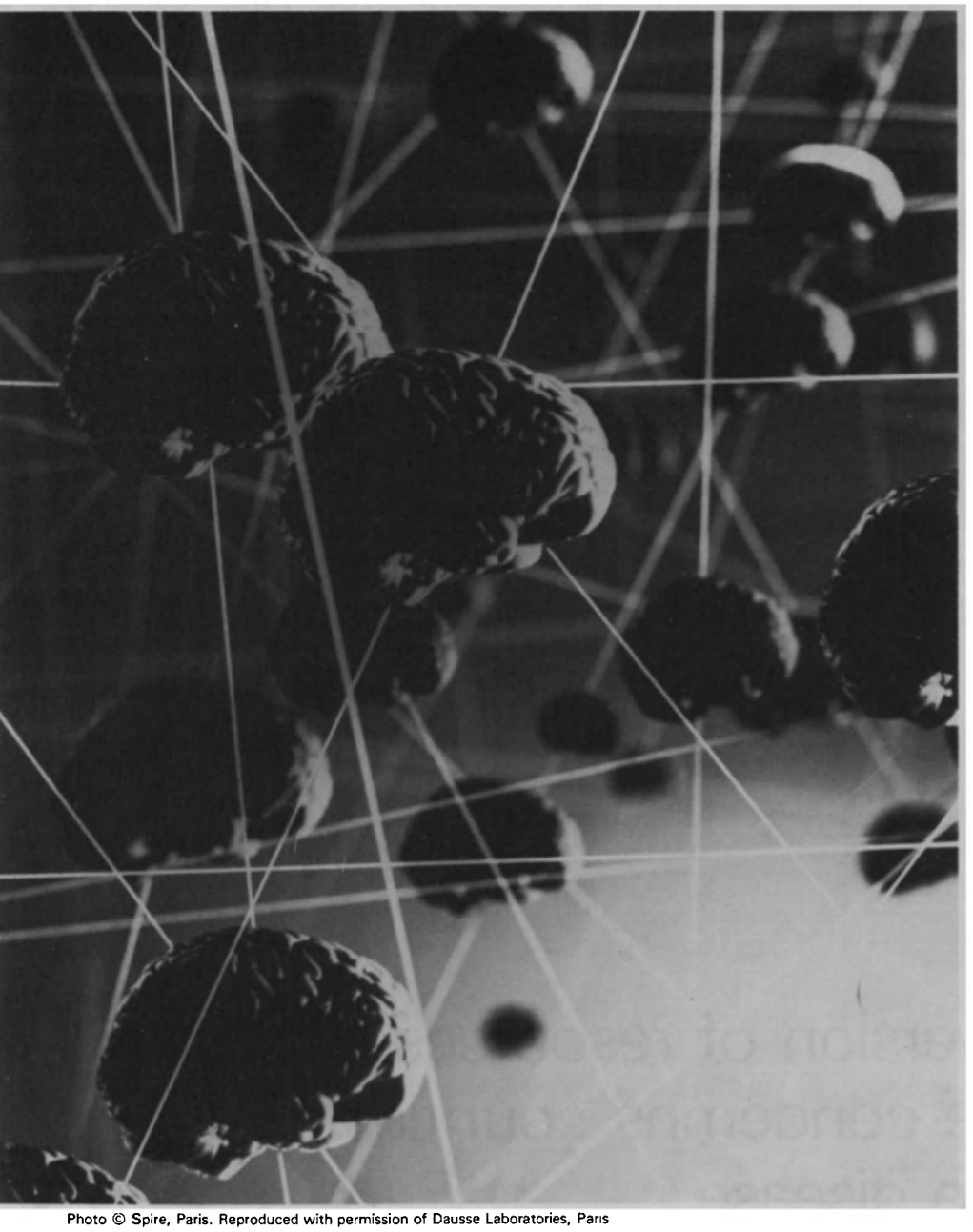
During the twentieth century, military thinking has been concentrated less on defeating particular groups of enemy troops and more on denying terrain to the enemy by covering large areas with concentrations of missiles. This involves a massive stepping-up of fire-power and the use of indiscriminate weapons such as delayed-action, multiple bombs, non-directional fragmentation mines and booby traps of all kinds.

This development has led the United Nations to call a conference, to be held in Geneva in September 1979, with a view to reaching agreements on "prohibitions or restrictions of the use of specific conventional weapons, including those which may be deemed to be excessively injurious or to have indiscriminate effects, taking into account humanitarian and military considerations, and on the question of a system of periodic review of this matter and for consideration of further proposals".

Some of the weapons the conference is likely to consider are described below:

The cluster bomb is typical of the modern indiscriminate anti-personnel

The deadliest weapon of them all?



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weapon. To outward appearance a cluster bomb is similar to a conventional 350 kg bomb, but it is designed to open in mid-air and scatter large numbers of grenades or bomblets, with or without delay fuses, over a wide area. Systems have also been developed that are capable of dispensing incendiary, chemical and biological agents. The possibility of using these weapons far behind the battle front adds greatly to the danger of indiscriminate effects.

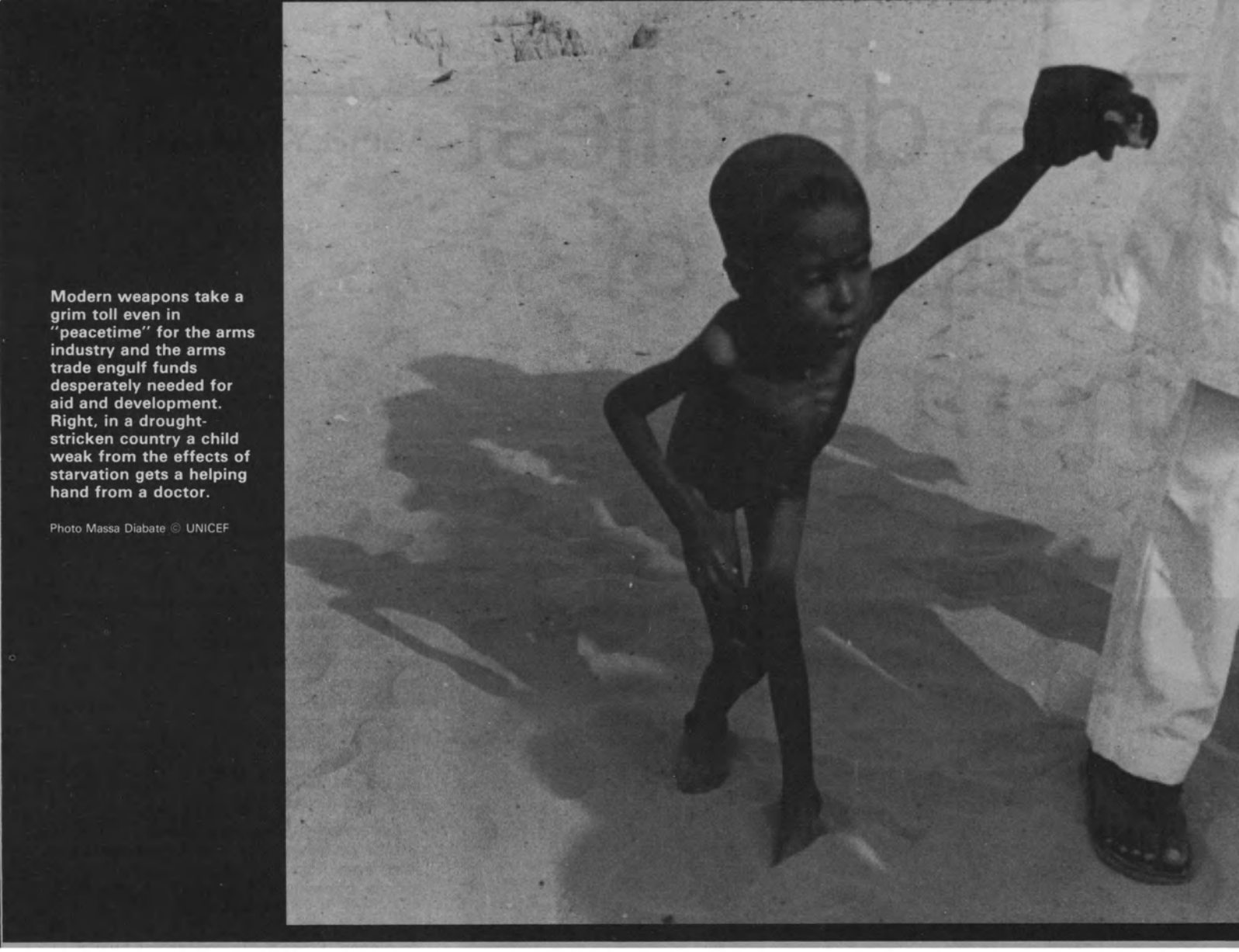
Flechettes are small needle-like darts or arrows, usually made of steel, that can be fired from rifles or shot guns using cartridges containing from four to twelve flechettes. Rocket warheads containing as many as 6,000 flechettes have also been developed. Since flechettes tend to buckle into a hook shape on impact, the wound inflicted is particularly big and nasty and usually fatal.

Booby traps are concealed explosive devices attached to apparently harmless objects; they are activated, for example, when the door of an abandoned house is opened or a radio is switched on. There are even reports of booby traps being attached to the bodies of dead or wounded soldiers.

Fuel-air bombs have been developed that spray out a cloud of gas or an aerosol of particles of, for example, aluminium or magnesium, which detonate when mixed with a certain proportion of oxygen. The cloud spreads out over a wide area and may penetrate trenches and foxholes before exploding.

Bounding fragmentation mines are anti-personnel mines which, when activated, jump to about eye level before detonating. Mines of all kinds present a particular danger to civilian populations, sometimes for many years after hostilities have ended.

This text, prepared by the editorial staff of the Unesco Courier, *is based on a recent study by the Stockholm International Peace Research Institute:* Anti-Personnel Weapons, *published for SIPRI by Almqvist and Wiksell International (for Norway, Sweden, Finland and Denmark), Crane Russak and Co., Inc. (for the United States of America) and Taylor and Francis Ltd. (for the rest of the world). 1978, 299 pp., £9.*



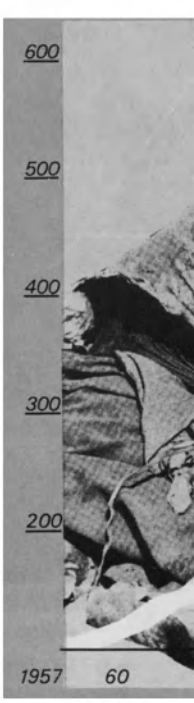
Modern weapons take a grim toll even in "peacetime" for the arms industry and the arms trade engulf funds desperately needed for aid and development. Right, in a drought-stricken country a child weak from the effects of starvation gets a helping hand from a doctor.

Photo Massa Diabate © UNICEF

Millions of victims before a shot is fired

The massive diversion of resources to the arms race condemns countless human beings to disease, starvation and illiteracy

RATE OF INCREASE
EXPENDITURE, 1957

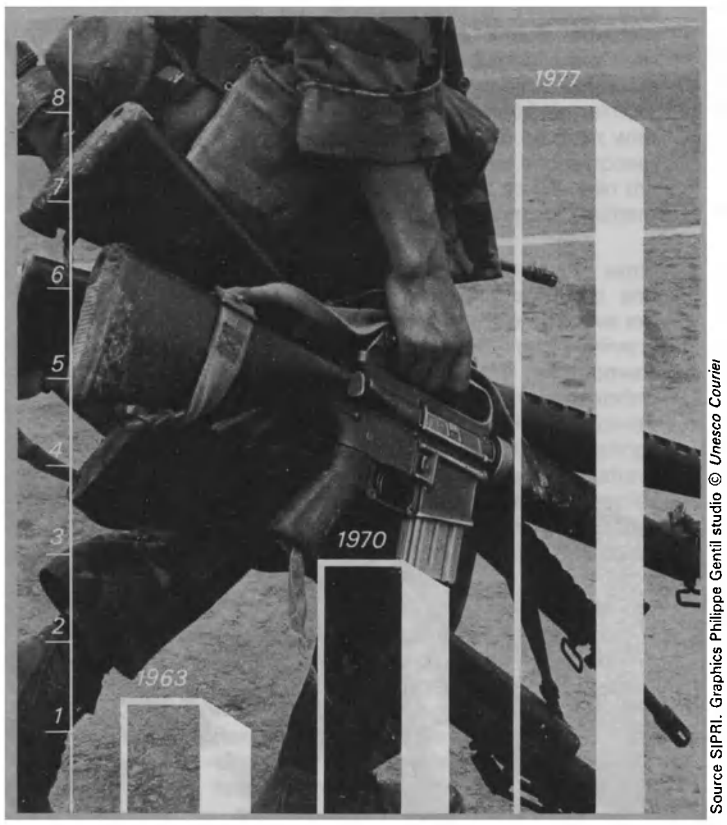


OF THIRD WORLD MILITARY
1977 (constant 1973 prices) ***Index 1957 = 100***

Source SIPRI. Graphics Philippe Gentil studio © *Unesco Courier*

Global spending on military activities runs at not far off $1 million a minute in a world where some 500 million persons are seriously undernourished, 800 million are illiterate, 1,500 million lack adequate medical services, 750,000 die every month of waterborne diseases, and 250 million children under 14 are without schooling. An important feature of world military spending in recent years has been the steadily rising proportion spent by the countries of the Third World. About 75 per cent of the current trade in major weapons—armoured vehicles, aircraft, ships and missiles—is with the Third World. Figures in graph top right exclude small arms, ammunition and artillery and are estimated to reflect only about one half of the total procurement of military equipment by Third World countries.

VALUE OF MAJOR WEAPONS.TRANSFERRED TO THE THIRD WORLD (constant 1975 prices) ***US $ thousand million***



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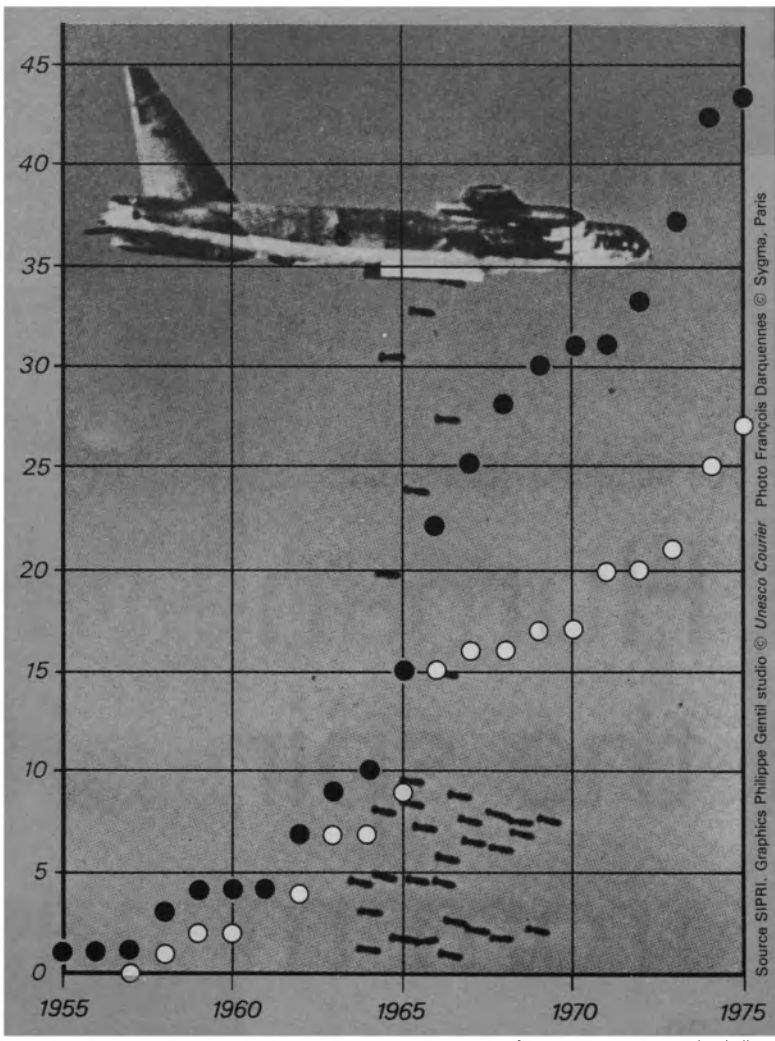
PROLIFERATION OF SOPHISTICATED WEAPONS TO THIRD WORLD COUNTRIES
Number of countries



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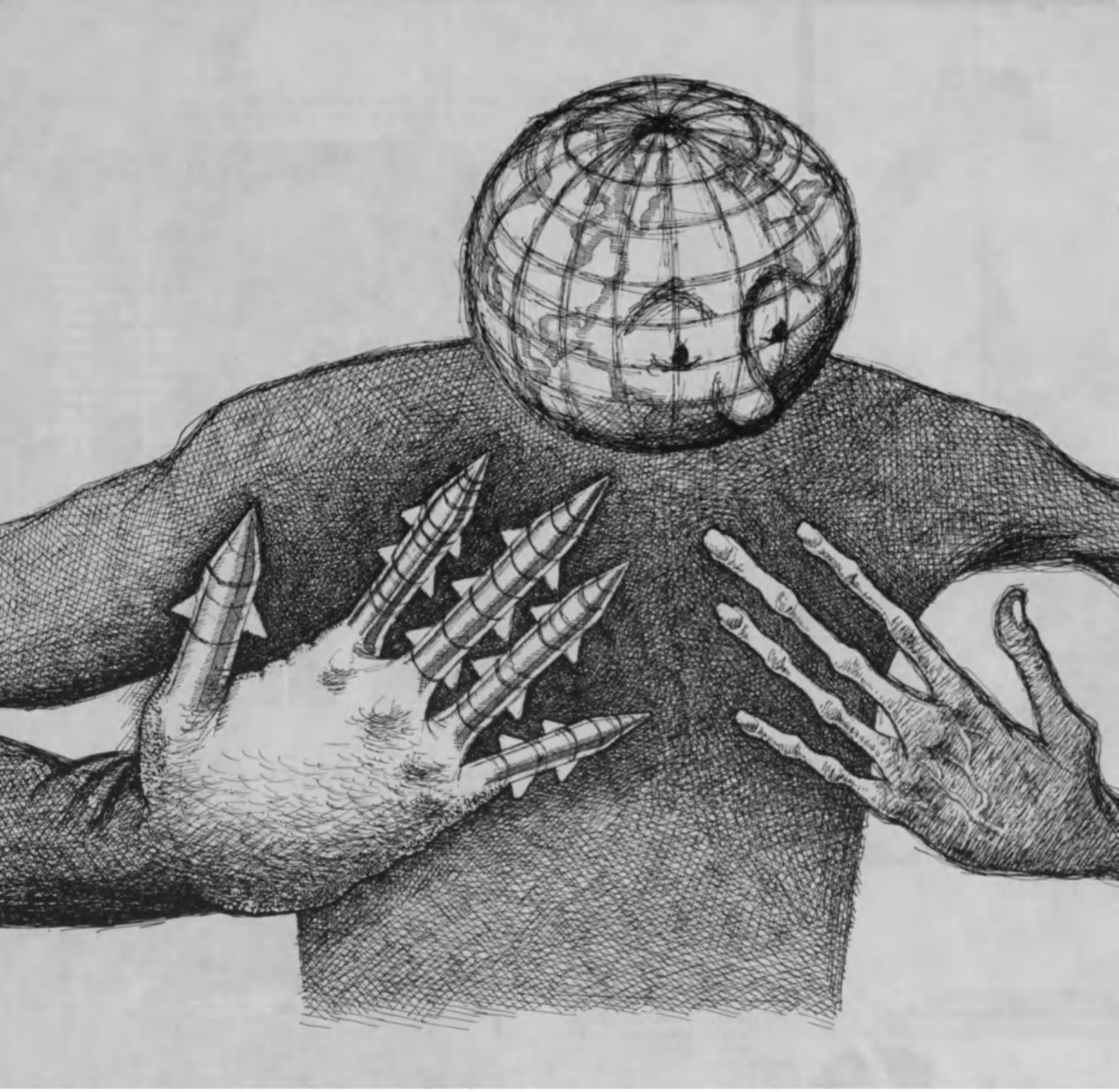
● Supersonic aircraft

○ Long-range surface-to-air missiles



THE ARMS RACE

Human want— the spin-off from military waste

WITH its economic costs and social and political effects, the arms race constitutes a serious obstacle to the establishment of a new international economic order. Exacerbated by the population explosion, the food crisis and the devastations of natural disasters and war, the problems of eradicating poverty and of improving standards of health, nutrition, education and housing have become acute in many parts of the world.

No less important are the problems of industrialization and growth in developing countries, of combating the deterioration of the environment, of halting the degradation of cities, of developing new sources of energy and raw materials while preserving presently available sources. All of these make claims on investment, research and other resources, in direct competition with military claims.

Meanwhile, the massive diversion of resources to military ends continues unabated. The global waste of financial resources, manpower, raw materials, technical skills and research and development capability goes on year after year. Every year military activities throughout the world absorb a volume of resources equivalent to about two-thirds of the aggregate gross national product of those countries which together comprise the poorer half of the world's population.

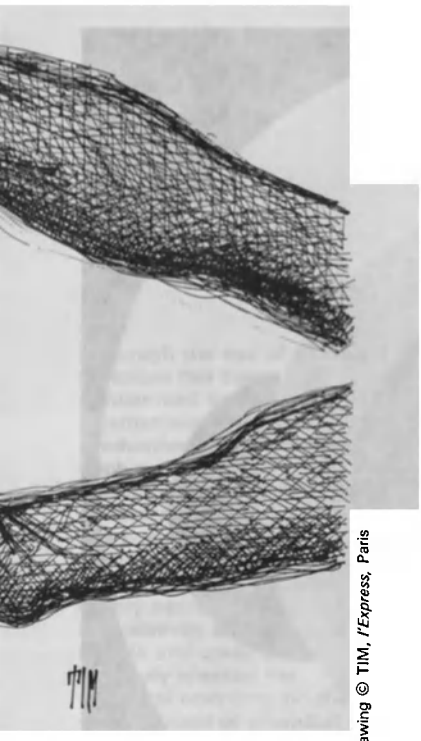
It is in the field of scientific and technological capability that the diversion of resources to military ends is most massive. It is estimated that at the present time some 25 per cent of the world's scientific manpower is engaged in military-related pursuits. It has been estimated that of total cumulative research and development spending since the Second World War some 40 per cent has been directed at achieving military ends. By far the largest part is spent on the development of equipment which has no conceivable civilian use. Medical and biological research, research related to the protection of the environment or to the specific needs of developing countries have consumed few resources compared with military research.

The potential benefits over the years from the redeployment of research and development resources which effective disarmament would permit are incalculable. In the developing countries enormous needs, unexplored in almost every respect, are waiting to be dealt with in the systematic, large-scale and purpose-oriented fashion which has so far been the almost exclusive prerogative of military research.

In many other fields there is the same urgent need for increased scientific and technological resources. The effective exploitation of the food and mineral resources of the oceans, the development of new sources of energy, the monitoring of environmental health hazards, meteorological research and forecasting, natural disasters warning and natural resource surveys are only a few examples of areas where skills and facilities of the types now wasted in military pursuits could easily be used.

It is evident that in all these fields the civilian spin-offs from military research, if not in all cases negligible, have been trifling in comparison with the resources with which they were bought and with the results that could have been achieved if the efforts had been aimed directly at civilian applications.

Manpower is another resource on which the arms race makes heavy and wasteful demands. The armed forces around the world total approximately 22 million people. In the United States, for every three persons in the armed forces another four are engaged in military-related employment. It is estimated that for the world as a whole, 60 million people are engaged in military-related occupations, uniformed or civilian, public or private. Military and military-related activities everywhere absorb a proportion of the most qualified categories of persons which is much higher than the share of the military budget in the gross national product might lead one to expect.



Drawing © TIM, *l'Express*, Paris

Death from hunger in the missile age, Africa 1973.

Photo © Parimage, Paris

Protection of the environment is an important part of the resource problem and the work of repairing the environmental damage of the past and preventing or minimizing further degradation is hampered in many ways by military activities.

Peacetime military activities, defence industries, military installations, manœuvres and the like may be assumed to cause environmental damage on top of that produced by civilian activities, roughly in proportion to the share of military expenditure in gross national product, but the supreme mode of environmental destruction, deliberate or merely incidental, is, of course, war.

Military technology has acquired or perfected means, including saturation bombing, incendiaries, chemical and, of course, nuclear explosives, of a nature to cause extensive and in some cases persistent environmental damage. In South Viet Nam more than 100 kilograms of dioxin, the chemical of which 2.5 kilograms were accidently released around the Italian town of Seveso in 1976, were inadvertently disseminated as an impurity in one of the widely used chemical defoliants. Concentrations in some areas reached 5 per cent of the level which has rendered areas around Seveso uninhabitable. This and a range of other environmental and ecological consequences of the Indo-China war are such that it is estimated that the recovery period, at best, will have to be measured in decades.

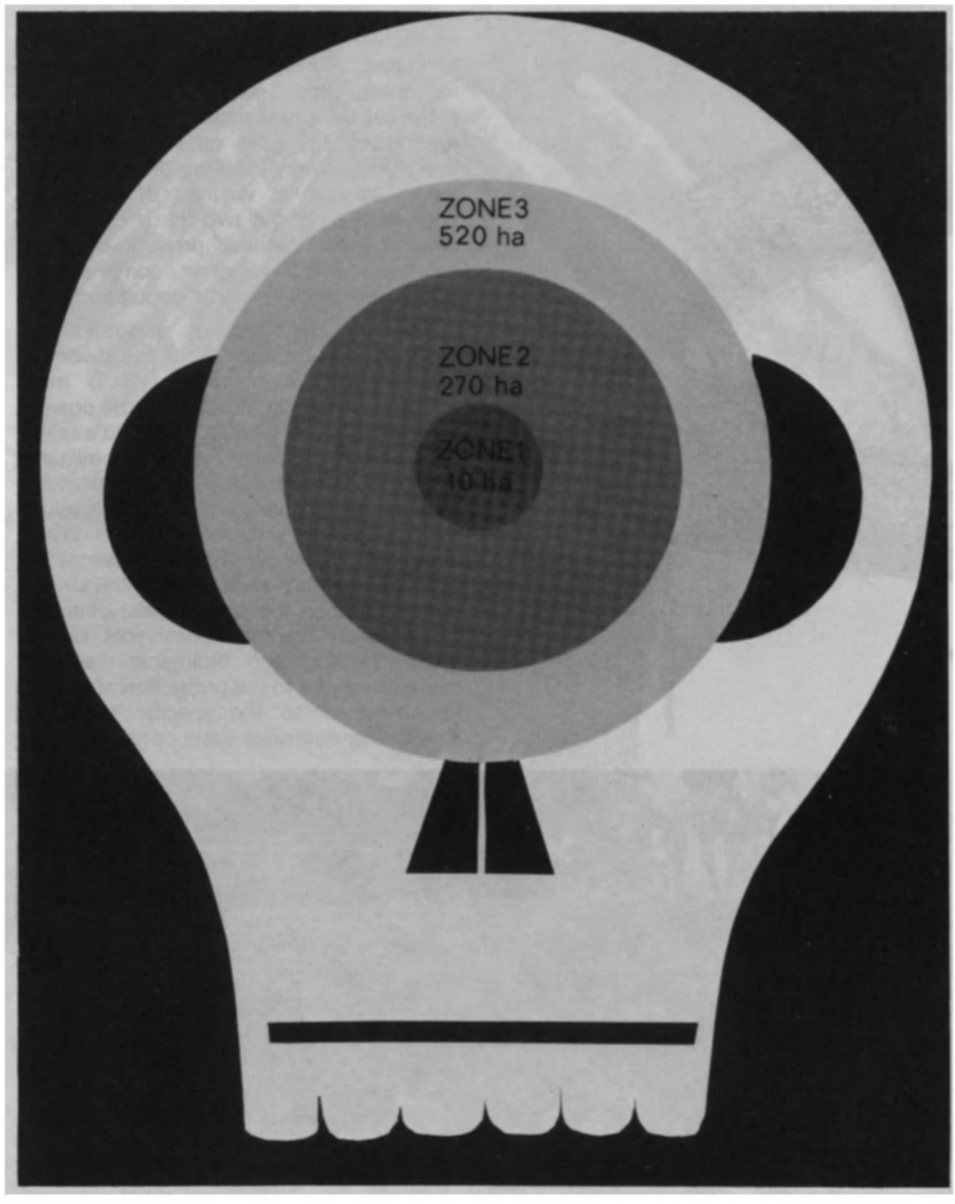
The world's armed forces are also major consumers of a wide range of non-renewable resources, including both energy and raw-material reserves. It is clear that the consumption of raw materials for military purposes is even more concentrated in the main military powers than is resource consumption generally. For such metals as aluminium, copper, lead and zinc, military demand in the United States is 11 to 14 per cent of total demand. For several other metals it approaches 10 per cent. For titanium it exceeds 40 per cent.

Extrapolating from United States figures, world military consumption of liquid hydrocarbons (excluding petroleum products used in the production of weapons and equipment) has been estimated to be about 700 to 750 million barrels annually. This is twice the annual consumption for the whole of Africa and corresponds to approximately 3.5 per cent of world consumption. For jet fuel on the other hand, military consumption (in peacetime) is reportedly one third of total consumption for the United States. Even though information is mostly lacking it is evident that the military contribution to the depletion of natural resources is substantial in many cases.

The consequences of the arms race in terms of natural resources may be illustrated by the situation as regards nuclear fuel. The latest survey of uranium resources, production and demand show that, while there is a great expansion of prospecting and development resulting in major new discoveries, there will nevertheless be formidable problems in ensuring that there is enough uranium at competitive prices to meet demands for the next twenty-five years. The report estimates that during that period it will be necessary to invest about $20,000 million in exploration and a similar sum in mining and milling.

The amount of fissile material in military arsenals is not known, but if disarmament released 2,000 tons it would be enough to provide the initial and replacement fuel over their useful life for an installed capacity of about 100,000 electrical megawatts of thermal reactors. For comparison with these figures, current estimates of the total installed capacity of nuclear power plants are 200,000 electrical megawatts in 1980 and 700,000 to 800,000 in 1990.

In addition, complete nuclear disarma-



Source SIPRI. Graphics Philippe Gentil studio © *Unesco Courier*

Now that current stocks of "strategic" nuclear weapons are sufficient to destroy the world many times over (their combined explosive power is estimated to be well over a million times that of the bomb that destroyed Hiroshima on 5 August 1945), attention has turned to the "improvement" of "tactical" nuclear weapons. The latest project is the enhanced-radiation neutron bomb with a "low yield" of about one kiloton (equivalent of 1,000 tons of TNT). This bomb is more destructive to life than to property. Diagram above shows zones of destruction for a one-kiloton neutron bomb detonated 200 metres above the target area. Zone 1: total annihilation and disruption of the site. Zone 2: All human beings would be incapacitated within five minutes and would die within four to six days. Zone 3: Fifty per cent of all people caught in the open would die, after much suffering, within a period of several days to several weeks.

490 ha 350 ha 330 ha 100 ha 40 ha

Source SIPRI. Graphics Philippe Gentil studio © *Unesco Courier*

Diagram right shows devastating environmental effects of the detonation, of a one kiloton neutron bomb. In an area of 490 hectares around the point of detonation fifty per cent of mammals and birds would die. Closer to the centre of detonation, the bomb would also be lethal to many other forms of life: within 350 hectares, to many trees and higher plants; within 330 hectares, to many amphibians and reptiles; within 100 hectares, to many insects; within 40 hectares, to many microorganisms such as bacteria, fungi, etc.

ment would release more than 20,000 nuclear scientists and engineers, now working on military applications of nuclear energy, some of whom could assist in the peaceful nuclear programmes of developed and of developing countries.

With world military expenditure remaining relatively stable in real terms since 1968 and world output continuing to grow, even if only very slowly by the middle of the 1970s, there has been, of course, a favourable trend in the ratio of military to various non-military areas of expenditure. Public expenditure on education, for example, overtook military expenditure in 1973. But this is a world average and there are very large differences between countries. In the world as a whole there are almost as many soldiers as there are teachers.

As with education, public expenditures on health services have expanded rapidly in recent years. Nevertheless, public health expenditure (to which privately-financed medical care should be added to complete the picture) only amounts to about 60 per cent of military expenditure on a world basis. Again differences between countries are very large. Even greater imbalances exist in the critical field of research funding. The resources devoted to medical research world-wide are only one fifth of those devoted to military research and development.

In all cases the resources consumed in the military sector are very large compared with the social expenditures of governments, even in such important fields as education and health, indicating the unfortunate priorities that govern the allocation of public funds throughout the world.

Yet if these priorities could be changed, even a small proportion of the resources now wasted on military pursuits could go a long way towards alleviating some of these problems, as a few examples will clearly show.

The most alarming situation of all is in the area of nutrition. Five hundred million people throughout the world are severely malnourished and millions more subsist on diets that are far below minimal needs. The physical and mental development of a large proportion of young children in developing countries is blocked because of diet deficiencies, and this entails incalculable consequences for the next generation.

In recent years famine has struck entire regions of the world and on a *per capita* basis food production in the developing countries as a whole has been declining. Yet the poorest countries, those with *per capita* incomes below $200, generally countries whose military expenditures are modest in relation to their gross national product, nevertheless spend (on average) about as much on military activities as they spend on agricultural investment.

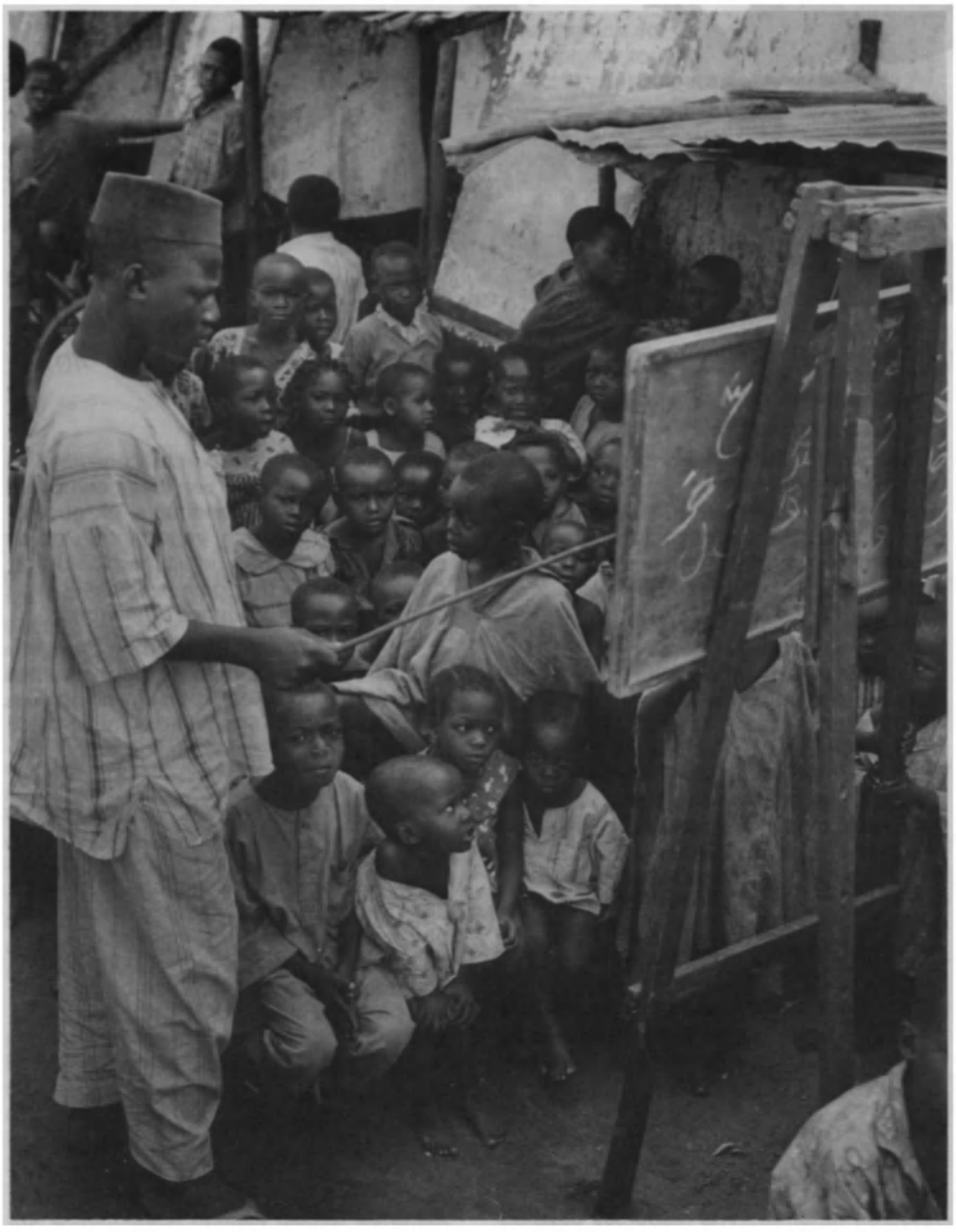
To complement national programmes, there is a desperate need for international assistance to finance increased food production and the establishment of emergency reserves. At the World Food Conference, in 1974, it was estimated that development assistance to agriculture needed to be stepped up to five to six thousand million dollars annually for the remainder of this decade.

While fund-commitments for this purpose have risen substantially since then, they are still two to three thousand million dollars below the target. To close this gap, funds equivalent to one per cent of the military budgets of industrialized countries would be sufficient.

The vast benefits which could result from even trifling cuts in military expenditures and the reallocation of the funds thus saved, are particularly obvious in the field of health. The World Health Organization (WHO) spent around $83 million over 10 years to eradicate smallpox in the world. That amount would not even buy a single modern strategic bomber.

Although the use of chemical weapons has been condemned by a number of international agreements, the production and stockpiling of such weapons have continued. An alarming development in recent years has been the emergence of a new generation of lethal chemical warfare agents, the binary nerve gases, which are relativily innocuous to handle and could thus seriously weaken the technical restraints on the development of chemical weapons.

Photo G. Bellorget © Gamma, Paris



Open-air classroom scene in Lagos (Nigeria). It has been reckoned that the numbers of the world's armed forces, supported by millions of civilians in military-related jobs, are today twice as large as those of all the world's teachers, doctors and nurses.

Photo Unesco/Almasy-Vauthey

The WHO programme to eradicate malaria, estimated at a cost of some $450 million, is dragging on owing to lack of funds. Yet its total cost over the years is only half of what is spent every day for military purposes, and only a third of what will be spent, strictly for procurement, for each of the new "Trident" nuclear missile submarines.

According to 1975 statistics, more than one thousand million people in 66 developing countries live in areas where malaria is endemic, adding its effects to the other privations of poverty, inadequate nutrition, insanitary water supply, poor housing, and multiple infections, causing high prevalence of disease and high mortality, especially in the young, and undermining the capacity of the people in these communities to improve their lives materially and socially.

The eradication of some of the major communicable diseases would cost trifling amounts compared to the cost of the arms race. Moreover, the potential benefits of a transfer of resources from the military to the health sector reach far beyond the immediate humanitarian aspect. The implementation of such eradication programmes would by itself release important resources in the medical sector for new tasks, and by improving the general standard of health in affected areas, would enhance the ability of people to improve their social and economic conditions in other respects. ■

Unless he is deaf, no one who lives where millions of human creatures are subjected to sub-human conditions and reduced to virtual slavery can fail to hear the clamour of the oppressed. And the clamour of the oppressed is the voice of God. Unless he is quite without heart, no one who has at last come to recognize the injustice that results from the unequal distribution of wealth can fail to be aware of the protest—be it silent or violent—of the poor. And the protest of the poor is the voice of God.

Dom Helder Camara (1909-)
God's Voice Today, from
The Desert is Fertile

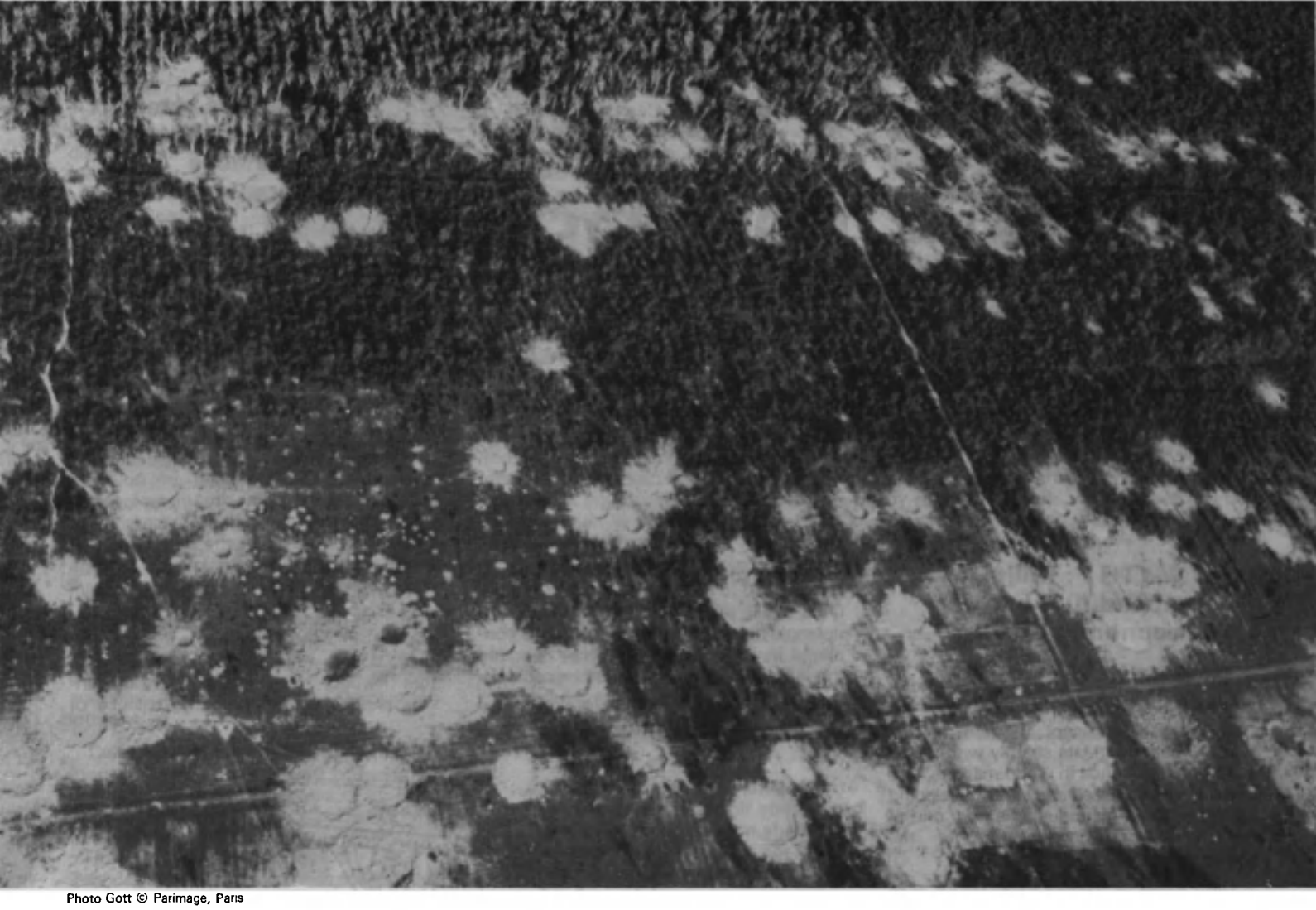
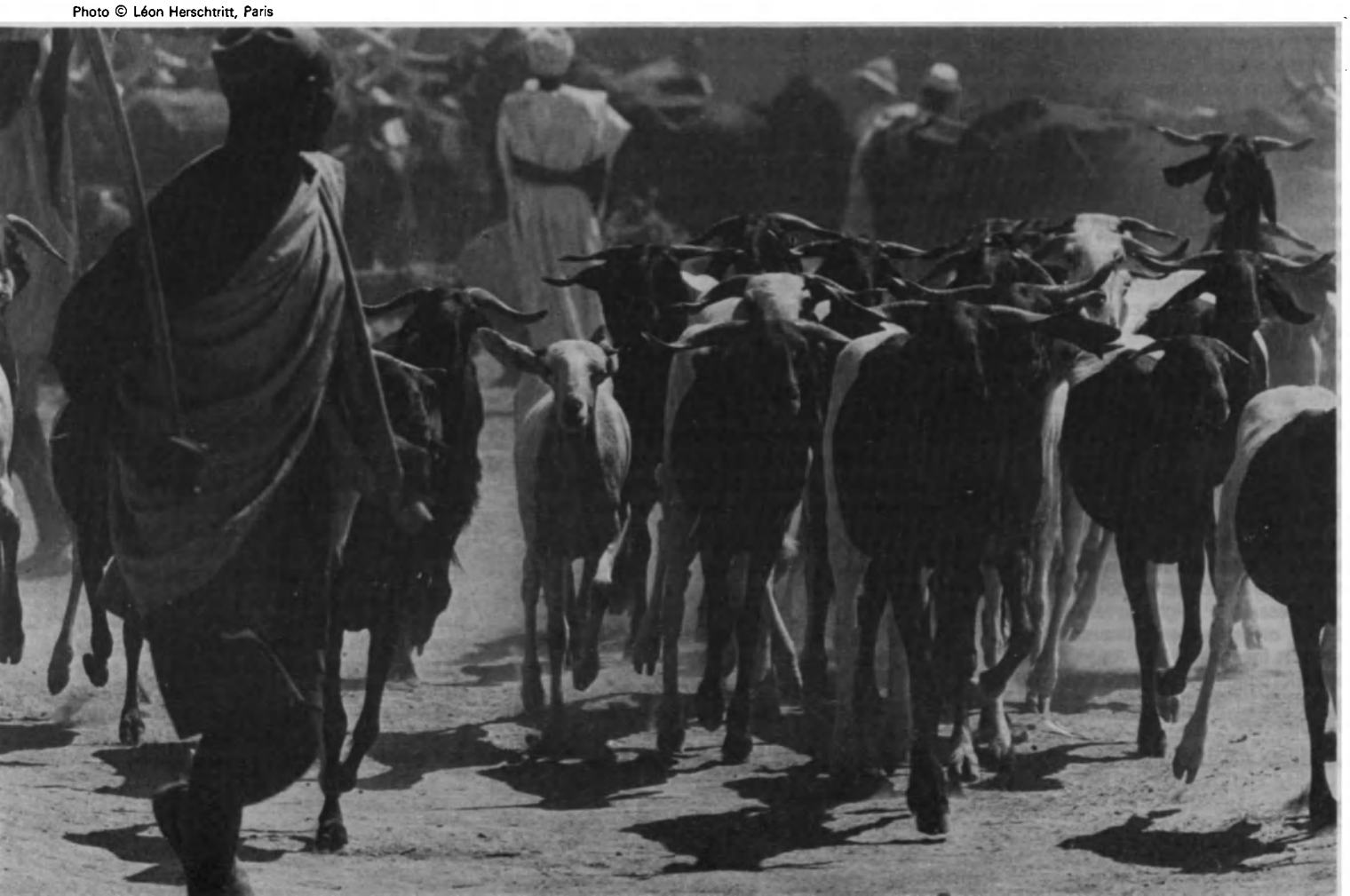


Photo Gott © Parimage, Paris

"They make a desert and call it peace". Since the Roman historian Tacitus wrote those words almost 2,000 years ago science and technology have enhanced mankind's power over the environment, for good or evil, to an almost incredible degree. Above, the crater-pitted landscape that was left when the bombers had passed. Below, market scene at Fort-Lamy (Chad) in the Sahel, the vast belt of semi-arid land bordering the southern Sahara. Stricken by disastrous drought in recent years, the Sahel is only one of many regions whose peoples stand to reap immense benefits from the harnessing of science and technology to peaceful uses.

Photo © Léon Herschtritt, Paris



Three myths that die hard

MYTH I : Military expenditure boosts economic growth

THE international arms market has grown in recent years at a rate which contrasts sharply with otherwise sluggish trends in world markets, and in many industrialized and some developing countries the arms industry is now one of the fastest growing sectors of the economy.

High levels of military expenditure have not been noticeably affected so far by the economic recession which hit many countries after 1973. Indeed, in some countries there is a marked contrast between a still buoyant military sector on the one hand and, on the other, a depressed civilian economy and a tightening of government budgets, in some cases even to the point of austerity. In certain limited areas the arms race has even gathered a new momentum directly related to the economic crisis, since some countries have been able to improve their balance-of-payments positions by increased arms exports.

But growing expenditure on armaments is not an efficient way of combating recession. Expenditures on such items as education, health, housing and social welfare are more effective for both economic and social reasons.

First, the maintenance of high and rising armaments expenditures in the face of stagnating or falling government revenues may lead countries to economize in such areas as health, education and welfare with all the negative social consequences this entails.

Secondly, recession nowadays tends to go hand in hand with high rates of inflation ("stagflation") and, in some cases, with heavy balance-of-payments deficits, and high arms expenditures have proved to be a hindrance for economic policies leading out of recession. High government expenditure on armaments increases demand without increasing the volume of saleable or exportable goods. It thus intensifies the problems of inflation and of the external balance.

Military expenditures, therefore, reduce the effectiveness of expansionary policies or even lead to restrictive measures in other fields which tend to prolong recession and unemployment. To the direct waste contained in armaments production is added the indirect wastage of unused resources.

In most countries, therefore, there is scope for significant rises in investment if military budgets are reduced. Even crude calculations indicate that the potential effects of this growth could be substantial. If the greater part of world military expenditure could, instead, be allocated to investment, growth rates might be expected to increase by one or two per cent. This is in fact very large—perhaps one third of the growth rate achieved in the world as a whole in the early 1970s, and probably larger than the growth rate of world output in the mid-1970s.

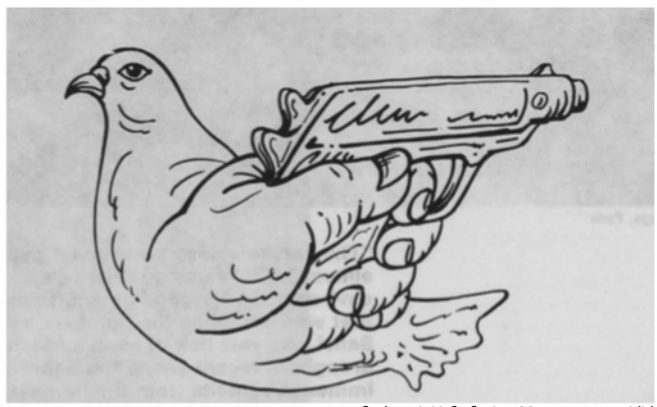
If such higher rates of investment are sustained, the effects on growth cumulate over the years. Thus, if half the funds spent on armaments throughout the world in the period from 1970 to 1975 had instead been invested in the civilian sector, annual output at the end of this period could have been perhaps $200 thousand million larger than it was. The sum of $200 thousand million is somewhat more than the aggregate gross national product of southern Asia and the mid-African region, the two large regions of acute poverty and slow growth in the world, with a total population of over one thousand million people. Over a longer period the effects on world output of the reallocation of part of world military expenditures to investment purposes would be even more spectacular.

MYTH II: the arms industry offers a panacea for unemployment

A major factor in the growth equation, manpower is today being diverted to military ends on a massive scale. Labour constitutes a real resource that could be employed to useful ends if released from occupations connected with the military sector.

This is not contradicted by the fact that in many countries a considerable fraction of the work force is now either unemployed or underemployed. For people are not unemployed because there are no more needs to satisfy. They are unemployed or underemployed because of recession or structural problems in the economy, and these are themselves aggravated by high military expenditures.

In most developed market economies the use of demand stimulus to deal with unemployment has been inhibited by fears that it would enhance inflationary tendencies and adversely affect the balance of payments. But inflation and, in some cases, balance of payments deficits have probably been aggravated by high rates of military spending sustained over a long period.



Serigraph U.G. Satho, Mecanorama exhibition © J.C.A., Tokyo

In any case, under appropriate conditions funds released from military budgets can be used to raise demand in the civilian sector without stimulating inflation, and, generally speaking, without affecting the balance of trade either way. Indeed, to the extent that military procurement is more inflationary than most other forms of expenditure a dollar for dollar reallocation of monetary resources to civilian ends would in the longer run ease inflationary pressures and leave greater scope for policies to curb unemployment.

Despite these obvious facts there is a tenacious myth, dating back to the German rearmament prior to the Second World War, that high arms budgets protect against unemployment or at least mitigate it. This belief is seemingly self-evident and is reinforced when, as has often happened, governments have given publicity to the supposed employment benefits of arms procurement they were contemplating, without adding that alternative uses of the same funds would create jobs as well, and normally many more.

As a consequence it is still today a widespread belief that disarmament, or discontinuation of a specific weapons programme, would swell the ranks of the jobless, particularly when unemployment is already high. It should be stressed that such conceptions are wrong. Military outlays are not unique in their ability to generate employment. In fact, whereas military expenditures obviously create jobs in the industries supplying the armed forces, the growing high-technology component in military expenditures has eroded their direct and their overall potential for creating jobs.

Today there is rapidly accumulating evidence that high military budgets contribute substantially to overall unemployment instead of alleviating it. According to United States Government estimates (and only for this country do figures seem to be available) a thousand million dollars of military expenditure creates 76,000 jobs. But if the same amount is spent on civilian programmes of the Federal Government it creates an average of over 100,000 jobs, and many more than this if channelled into activities that are particularly labour-intensive.

Calculations indicate that if the same thousand million dollars were released for private consumption by means of tax-cuts 112,000 new jobs would be created. In other words, a 10 per cent cut in the military budget, that is to say a cut of $8 to 9 thousand million and a corresponding tax reduction, could diminish unemployment by 300,000 and more than this if cuts and alternative programmes were selected with a view to maximizing the effect on unemployment. Thus, the proposition that military expenditure generates employment at least as effectively as, if not more than, non-military expenditure is demonstrably false.

MYTH III: military research is the major spur to technological progress

In the case of technological innovation, no less than in the case of manpower and unemployment, the true impact of high military expenditure has mostly been clouded in myth. The basic fact of an enormous diversion of resources has been disguised by excessive claims about the importance of civilian spin-offs from military research and development.

The drive for continuous improvement in weaponry and military equipment, so the argument goes, has been an important spur to technological progress, and, so it continues, without the urgency of military demands, funds on a sufficient scale would not have been forthcoming.

A limited number of examples, always the same, are cited to prove the case—nuclear power, air transportation, radar, space technology and a few more. Yet a sober assessment indicates that the claims are grossly exaggerated and even the standard examples are not all convincing. In fact it is remarkable how many inventions of the greatest civilian importance in production techniques, in materials, in power generation, engines and appliances, in all fields of surface transportation and in communication owed absolutely nothing of their origin and very little, if anything, of their subsequent development to military research and development, even if they were often adopted by the armed forces and adapted to military requirements at a later stage.

Military spin-offs from civilian research have been incomparably larger than civilian spin-offs from military research. The truly remarkable fact is how little that is new, not how much, has come to the civilian sector from military research and development efforts. Product development in the sense of incremental improvements in materials, in miniaturization, in performance, in reliability, etc., has in some cases been made under military auspices, simply because this is where research and development funds have been readily available.

The typical emphasis of military research has been on devices which can perform the same function as the old ones, only more accurately, more effectively and more reliably. The post-war association of the military sector with advanced and dynamic sectors of industry and research has therefore been conducive to an emphasis not on basic research and genuine innovation, but rather on product improvement geared to details of specifically military devices to such an extent that civilian spin-offs of importance have been few and far between.

Military technology is moving further and further away from any conceivable civilian use, and is anyway focusing on fields which are mostly irrelevant for the solution of major world problems. There can be no doubt that in the final analysis technological innovation in the civilian sector and, with it, growth are not furthered by military research and development but are greatly impaired by it. ■

They shall beat their swords into plowshares, and their spears into pruning hooks: nation shall not lift up sword against nation, nor shall they learn war any more.

The Holy Bible
Isaiah 2 (4)

THE economic problems associated with disarmament and the reconversion it would entail should not be underestimated. These problems, which would be common to countries with different social and economic systems, would arise, because, inevitably, the manpower and facilities released by cuts in military expenditure would never exactly meet the requirements of the new non-military programmes that the reallocation of funds would make possible.

In the short run the skills required for expanded civilian research programmes might not precisely match those released from military programmes. Similarly, some firms now producing military equipment would need time and capital to readjust to civilian production.

Adequate funds for compensation or conversion for these sectors and special development programmes for regions or towns which would be particularly affected would, however, absorb but a tiny part of the resources saved. None of these problems are insurmountable from an economic or technical point of view.

Nevertheless, it would be of great importance if plans and legislation to facilitate conversion from military to civilian production were drawn up and adopted as soon as possible.

One useful approach of a general nature could be to require industries to rely on military orders for less than a given percentage of their production. Industries for which this is impossible for technical reasons might be required to seek location in communities and regions likely to be able to absorb their work force if it is made redundant. In some cases it might be desirable to disperse military production around the country.

Another approach, not an alternative but a complement to this, would be to require factories engaged in military production to draw up alternative plans for using their equipment and employees in civilian occupations. Such measures would not only be of assistance in disarmament, they would also help to break some of the most powerful coalitions of political forces opposing disarmament by rendering industry and workers less dependent on a steady flow of military orders.

It must be recognized, however, that conversion is primarily a question of particular communities, particular plants and particular groups of workers and scientists, and that it needs to be dealt with in concrete terms. When alternative plans are not available there may be a temptation, and sometimes irresistible pressures, to devise a new weapons project merely to keep the industry going. ■

Words of peace

THE CORPORAL: It's obvious, it's too long since there's been a war round here. So what does it all add up to? Peace means confusion and war means order, that's what. In peacetime people grow and prosper here there and everywhere, without any rhyme or reason. There's nothing but waste of men and beasts. People gorge themselves silly; they put a rasher of bacon on a hunk of white bread and then cheese on top of the bacon. How many young lads and how many sturdy horses are there in that town down there? Nobody's got a clue. They've just never been counted. I've seen places where there's been no war for nearly sixty years. The people didn't even have names; they didn't even know who they were. It's only where you've got a war that you'll find proper lists and up-to-date registers, shoes in bags and corn in sacks, animals and people all listed and accounted for. Because they say to themselves: "No order, no war", and they're dead right.

Bertolt Brecht (1898-1956)
Mother Courage and Her Children

Always precipitate where warfare is concerned, men rush headlong to their ruin, unmindful that conflict once begun becomes inevitable. Where is the briefest skirmish that has not led to longer engagement? What peace-breaking war, after however long or short a respite, has not in its turn spawned other wars? And finally, what clash of arms, however harmless at its outset, has not led in the end to monstrous bloodshed, once the combatants' anger is aroused?
Where the gravity of the situation is concerned, the people themselves are but poor judges; it is for the princes and their counsellors to ponder the matter. And it is for the clergy to enlighten the people, impressing on them by all manner of argument the error into which they are led; imposing themselves on all sides by their attitude, on unwilling and on willing ears alike, their reasoning must needs at least be heard.

Erasmus (1469-1536)
The Lament of Peace Decried on All Sides and by All Nations

To replace inhumanity by humanity in their relations demands a tireless, threefold struggle on the part of men. In the first place, they must—to some extent—set promptings of passion aside and, making allowance for their common frailty, agree that it is unseemly to heap hatred on each other for vain reasons; they must, as a general rule, place a seal of forgiveness on ancient disputes, wrongs and grievances. We may describe this as *effacing the past.* Secondly, no man should impose his principles (whether they be philosophical, theological or political in nature) on another; rather, each must permit his fellows to set forth their opinions and to enjoy in peace what belongs to them. We may describe this as *mutual tolerance.* Thirdly, all men must strive together for the common good, uniting their thoughts, their hopes and their actions to this end. And this may be described as *conciliation.*

Jan Amos Komensky (Comenius)
(1592-1670)
De rerum humanorum emendatione consultatio catholica

I Deganawidah
and the chiefs of the Five Nations of the Great Peace
we now uproot the tallest pine
into the cavity thereby made
we cast all weapons of war.

Into the depths of the earth
into the deep underneath...
we cast all weapons of war.

We bury them from sight forever...
and we plant again the tree...
Thus shall the Great Peace be established.

Iroquois poem
The Tree of the Great Peace

By a just or democratic peace, for which the overwhelming majority of the working class and other working people of all the belligerent countries, exhausted, tormented and racked by the war, are craving—a peace that has been most definitely and insistently demanded by the Russian workers and peasants ever since the overthrow of the tsarist monarchy—by such a peace the government means an immediate peace without annexations (i.e., without the seizure of foreign lands, without the forcible incorporation of foreign nations) and without indemnities...
In accordance with the sense of justice of democrats in general, and of the working classes in particular, the government conceives the annexation or seizure of foreign lands to mean every incorporation of a small or weak nation into a large or powerful state without the precisely, clearly and voluntarily expressed consent and wish of that nation, irrespective also of the degree of development or backwardness of the nation forcibly annexed to the given state, or forcibly retained within its borders, and irrespective, finally, of whether this nation is in Europe or in distant, overseas countries.

Lenin (1870-1924)
Report on peace, October 26, 1917

Let me live in a world where no exclusions are pronounced... in a world where men's only title is their humanity and where they are no longer obsessed by rules, by words, by labels.
Let churches and printing houses everywhere be open. When people visit their town hall, let there never again be someone waiting to arrest or deport them as they emerge; let them enter—and leave—the town hall with a smile. Let no one, ever again, have to flee in an open boat, or be chased down by motor-cycles. Let the immense majority, the only majority, the whole of mankind be free to speak, to read, to listen and to find fulfilment...

Pablo Neruda (1904-1973)
I Confess that I have Lived

Photo © Louvre Museum, Paris

THE ARMS RACE

The military establishment

On occasions of rejoicing precedence is given to the left; On occasions of mourning precedence is given to the right. A lieutenant's place is on the left; The general's place is on the right.
This means that it is mourning rites that are observed.

Lao Tzu (c. 570-490 B.C.)
Book of the Way and Its Power

CONTEMPORARY military institutions are often so powerful and pervasive that they can have a considerable impact on political and social conditions and perceptions and can impose important constraints on the evolution of societies. In this sense they can represent a major social force, influencing the social, political and ideological development of a country.

The extent to which military forces also act as a social and political force, and the form taken by their action, depends very much on circumstances, on the social framework, on economic conditions and on the political context. It would be a crude oversimplification to assume that the military establishment has the same characteristics everywhere or that its specific political impact could be talked about in general terms. Traditions, political and social affiliations, historical experiences in connexion with former wars or liberation struggles and the pattern of interrelationships with other institutions in society are too diverse.

There are cases in which the armed forces have become, for one reason or another, centres of attraction or incubation of modernizing forces in society and have played a role in social develoment going far beyond their strictly military functions.

In other cases they have constituted a major hindrance to social development and have served to perpetuate privileges and to repress popular aspirations. Nevertheless, it should be recognized that the military institution in the wide sense (including such

institutions as paramilitary forces or secret services which may be formally independent of it) enjoys a unique position of strength in many societies.

This is due to a variety of factors. First, there is its sheer mass combined with its highly centralized organization. Second, the armed forces may enjoy privileged relations with key sectors of industry, being at once a customer and a link with government. Thirdly, they are in a privileged position vis-à-vis the State and many areas of government policy (foreign, industrial, infrastructural, regional and others, depending on the circumstances). Fourthly, the military institution can, to a varying degree, protect its operations from public scrutiny, and conduct a variety of activities under the label of national security.

These may range from the establishment of a full-fledged covert foreign service or the covert conduct of military activities in foreign countries to keeping political opponents under more or less close surveillance. Last, but of course not least, the armed forces enjoy a monopoly of physical force and appear as the ultimate arbiter, both vis-à-vis other States and internally.

Militarization often goes hand in hand with social tension. As a means of domestic repression it is characteristic of countries where considerable social differences and extreme exploitation of large sectors of the population prevail. South Africa may serve as an extreme illustration, but a similar pattern, minus the racial dimension, can be found elsewhere. In such countries it is not unusual to find, for a period at least, a considerable rate of economic growth together with heavy expenditure on armaments and on domestic policing. To conclude from such instances that high military expenditure is consonant with economic growth is to disregard the social ends for which growth is only a means.

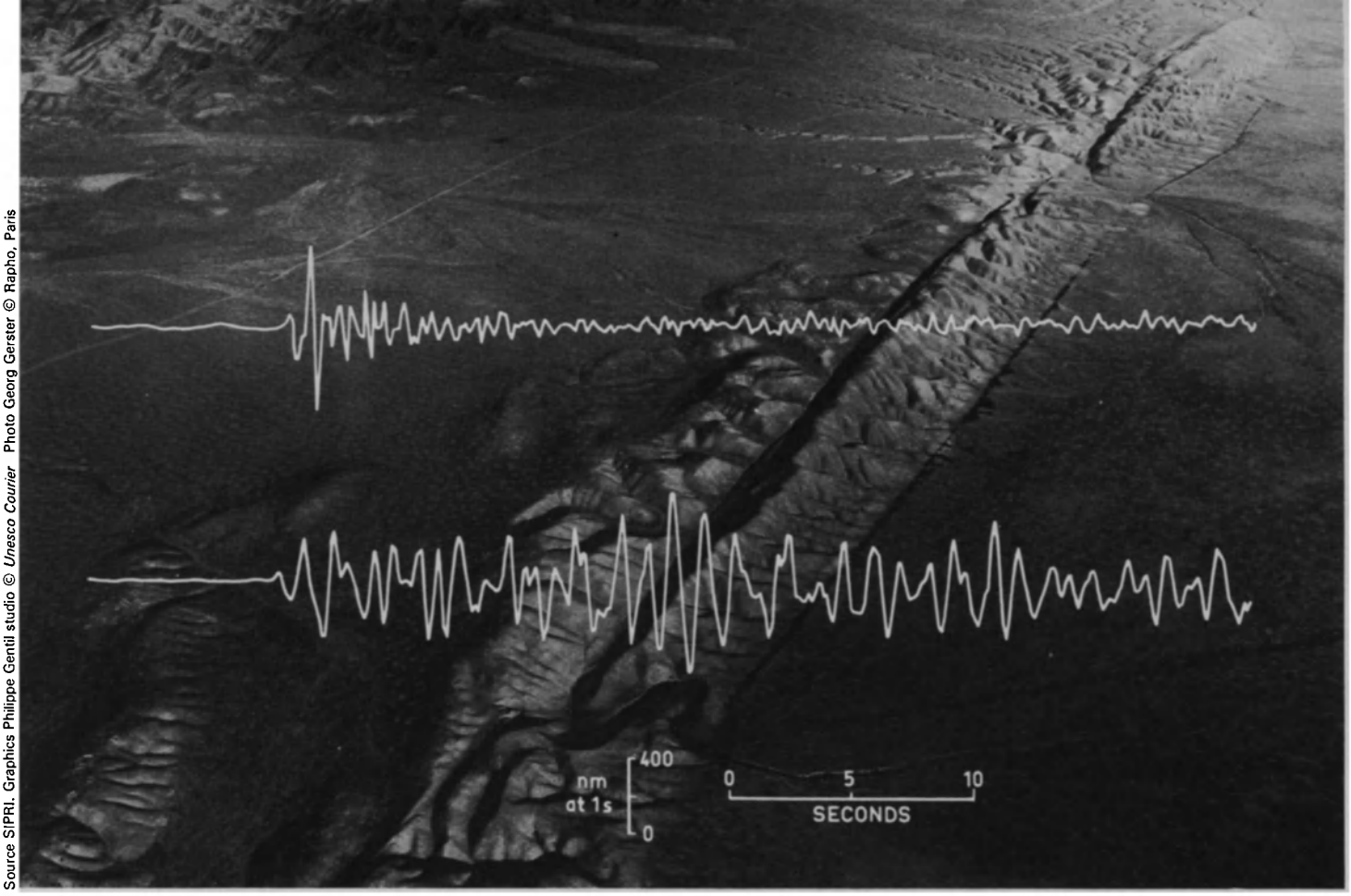
In most cases it may be assumed that the military institution and the armed forces have a double role. They are at once an ultimate recourse in external affairs and an ultimate arbiter in internal affairs. These roles are not always unrelated. During confrontation with an outside enemy the limits of tolerated dissension become narrower, and the real or supposed external threat may become a pretext for increased repression.

Conversely, when internal dissension transgresses the accepted limits, and when means for satisfying basic needs and aspirations are scarce, there may be a temptation to seek temporary refuge in domestic repression or in the escalation of foreign confrontation. Here governments may get trapped in an impossible situation where an increasing burden of military expenditures further delays economic and social progress, causes social structures to ossify and exacerbates social tension, while other policies seem to be precluded by a confrontation and an arms race with neighbouring countries. The conjunction of external and domestic confrontation, both of them temporarily stabilized through a military build-up but ultimately exacerbated by it, can give rise to a particularly precarious situation. ■

In a country where the brotherhood of man is an illegal doctrine, outlawed, banned, censured, proscribed and prohibited; where to work, talk or campaign for the realization in fact and deed of the brotherhood of man is hazardous, punished with banishment, or confinement without trial, or imprisonment; where effective democratic channels to peaceful settlement of the race problem have never existed these three hundred years; and where white minority power rests on the most heavily armed and equipped military machine in Africa... But we are not deterred in our quest for a new age in which we shall live in peace and in brotherhood.

Albert J. Luthuli (1889-1967)
Nobel Peace Prize acceptance speech

Photo © Gamma, Paris



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For over two decades the conclusion of a comprehensive nuclear test ban treaty has been impeded by the difficulty of reaching agreement on effective methods of ensuring compliance with such a ban. Verification would involve a variety of methods of monitoring including satellite surveillance, on-site inspections and seismic detection and identification of underground nuclear explosions. Above, seismograms obtained at the Hagfors obervatory, Sweden, from, top, an underground explosion and, bottom, a shallow earthquake. Although in this case the seismograms show clear differences between the explosion and the earthquake, for complex technical reasons the distinction is not always so clear-cut. Nevertheless, many experts now believe that, following technical improvements in seismographic instruments over recent years, it would be possible to establish an effective monitoring system consisting of a global network of seismological stations, access to photographic satellite data and an international data collection and evaluation centre. The United Nations is at present undertaking an experimental exercise aimed at testing and evaluating various elements of such a proposed global monitoring system.

Can the arms race be halted?

WARFARE has been a permanent feature of the period since the Second World War. Weapons have been in use on a significant scale virtually without interruption, more often than not in several places simultaneously. Casualties have been accumulating and since the Second World War have totalled many millions. To an overwhelming degree these conflicts have taken place outside the major industrialized regions of the world, although in many instances some major Powers have been directly involved and, virtually without exception, the means of warfare have been provided by these Powers.

These, plus the ever-present possibility of a nuclear conflagration, have been the strictly military consequences of the arms race.

But there are other important international consequences. First, there are the economic effects. By diverting vast resources away from production and

CAN THE ARMS RACE BE HALTED?

growth, and by contributing to inflation and the economic crisis which have affected many countries, the arms race directly and indirectly impedes the full development of international exchanges.

In addition, the flow of trade and aid is distorted, in some cases very markedly, by interference from political and strategic considerations,resulting in the misallocation of resources on a global scale. The arms race thereby contributes to maintaining and widening the gap between and within developed and developing countries and impedes co-operation between States, socio-economic progress generally and the promotion of a new international economic order.

Second, there is the impact of the arms race on international political conditions. In an environment characterized by high military preparedness on all sides, conflicts, even minor ones, tend to be exacerbated and security considerations become salient in the policies of countries.

This is an environment conducive to the creation of spheres of influence, in which local conflicts tend to become linked to regional or global confrontations and in which social and political developments are likely to be resisted if they seem to call existing alignments into question. The frictions arising from this rigidity at a time when the relative economic, political and military weight of countries is changing more rapidly than ever are themselves possible sources of conflict.

Finally, there is the destructive effect of the arms race on the social fabric. The fears engendered by having to live with stockpiles of nuclear weapons sufficient to destroy humanity altogether, kept in a state of constant readiness and subject to human or technical fault, have contributed to disaffection and disillusion, particularly among the young. There can be no doubt that the continuing arms race and the growth of violence in the world adds to the disaffection of many people, to their sense of futility and powerlessness, and turns them away from socially constructive ends.

Thus the arms race not only entails military conflict, heavy economic sacrifices and political division at the international level, it also threatens and perverts democratic processes, and weakens those processes of social evolution which provide the only real hope for the future of mankind.

There has been no lack of attempts to deal with the dangers of the arms race, even though successes have been relatively modest so far. In the 1960s and continuing into the 1970s, these efforts were characterized by two main features; one was the priority given to partial measures aimed at preventing the arms race from moving into certain new directions and the other was the emphasis on détente, the assumption being that relieving suspicion and fear would not only diminish the risk of war, but would also remove one of the main factors fuelling the arms race.

The past decade and a half has produced a considerable number of agreements on arms limitation, including:

- the Treaty Banning Nuclear Weapons Tests in the Atmosphere, in Outer Space and Under Water;
- the Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies;
- the Treaty on the Non-Proliferation of Nuclear Weapons;
- the Treaty on the Prohibition of the Emplacement of Nuclear Weapons and other Weapons of Mass Destruction on the Sea-Bed and the Ocean Floor and in the Subsoil Thereof;
- the Convention on the Prohibition of the Development, Production and Stockpiling of Bacteriological (biological) and Toxin Weapons and on Their Destruction;
- the Convention on the Prohibition of Military or any Other Hostile Use of Environmental Modification Techniques;
- the Treaty for the Prohibition of Nuclear Weapons in Latin America;
- the Soviet-American agreements on the limitation of strategic arms (SALT);
- the Treaty between the United States of America and the Union of Soviet Socialist Republics on the Limitation of Underground Nuclear Weapons Tests.

It has also produced agreements between the United States and the USSR and between France and the USSR on the prevention of nuclear war. Although these treaties and conventions have contributed to some extent to a new climate of understanding, they have not proved equal to the task of slowing down the arms race or of significantly affecting the actual basis of armaments.

Partial and collateral measures can play a role in the cessation and subsequent reversal of the arms race, but it is becoming increasingly clear that they must be conceived as part of a broader programme, inscribed in a whole set of measures aimed at substantial disarmament in areas of weaponry of central military significance.

If the partial measures are specially designed just as measures to regulate an ongoing competition in armaments, the danger exists that they simply shift this competition in other directions.

In the mid-1960s and the early 1970s, the partial measures achieved contributed to a climate of optimism, served to establish useful channels of communication, and demonstrated that agreements were possible, within limits at least. These measures thus undoubtedly contributed to promoting détente.

It is obvious that détente has had an important effect in relaxing the international climate, thereby diminishing the risk that conflicts on the periphery of the arms race or lesser conflicts involving the major Powers will escalate into nuclear war. By relieving the cold-war atmosphere between and within the main military alliances and helping to relax the rigid bipolarity of former years, détente has also helped to promote exchanges of all kinds. Indeed, such exchanges are not only a result of détente, they are part of the process of détente itself, and continued relaxations of set patterns of relations between the main alliances, within them and within countries individually, as recognized in the Helsinki Declaration on Security and Co-operation in Europe, are both aspects of, and preconditions for continuing détente.

By building international relations on a sounder basis, détente has improved the conditions for beneficial intercourse between States, for the development of economic ties, and for increased scientific, technological and cultural exchanges. These are major, even . decisive achievements, of the last decade or so, which must be vigorously pursued and strengthened.

While the overriding importance of détente deserves constant emphasis, so do the failures of this period. The fact that political détente has not been accompanied by corresponding measures of disarmament and military disengagement is its central weakness and a major cause of concern. Détente is being continuously assailed and undermined by the momentum of technological developments in armaments.

It is essential that détente should not be merely a process involving the main protagonists, a process limited geographically to certain areas and limited in substance by an immense rivalry in the military field. For a continuous build-up in armaments is clearly incompatible with serious attempts to eliminate the threat of war and to strengthen beyond a very limited point the confidence among States which must be the foundation of genuine détente. If the arms race is not reversed détente remains without a real basis, always in danger of sliding back into tension, suspicion, isolation and confrontation.

After more than a decade of attempts to curb the arms race it can be seen that these efforts have been inadequate. In every important respect the arms race is continuing apace, while much talent and energy has been spent on what are now seen to be issues of more marginal importance.

On several occasions it has been seen how the public, when adequately informed, can exercise a moderating influence on developments in the field of armaments, and fostering a genuine and widespread public concern about the dangers of the arms race may be one of the most important ways of giving a new momentum to efforts towards disarmament. This need for an active and well-informed public opinion capable of opposing all incitement to war and of channelling its concern in constructive directions is of vital importance, for where questions of armament and disarmament are concerned the very survival of humanity is at stake. ■

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☐ **Urban Hydrological Modelling and Catchment Research: International Summary,** by M.B. McPherson and F.C. Zuidema. (No. 18 in Unesco's "Technical Papers in Hydrology" series) 1978, 48 pp. (12 F)

☐ **The Peopling of Ancient Egypt and the Deciphering of Meroitic Script.** Proceedings of a symposium held in Cairo in 1974. The first volume in a new series to be based on studies and working papers of meetings held to prepare the major Unesco project **The General History of Africa.** 1978, 136 pp. (25 F)

☐ **Developments in Technical and Vocational Education, A Comparative Study.** The current situation and possible future trends of technical and vocational education in 23 countries. 1979, 143 pp. (22 F)

☐ **Cultural Policy in Bolivia,** by Mariano Baptista Gumucio. 1979, 81 pp. (16 F)

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in brief... in brief

Forging a future for Tanzania's village blacksmiths

Rural blacksmiths will be among the first beneficiaries of Tanzania's Small Industries Development Organization (SIDO) set up in 1973 with U.N. help. Tanzania has an ancient tradition of metal-working. A recent study in the U.S. journal *Science* (Vol. 20, p. 1085) describes how the country's Haya people produced high-grade carbon steel over 1,500 years ago, using technology not developed in Europe until the mid-19th century.

Brazil's sugar crop keeps traffic moving

Between 28 and 30 million bags of sugar will be converted to alcohol for use as an additive to petrol during the 1978-1979 sugar cane season, as part of Brazil's National Alcohol Programme. The goal of the programme is to produce 3,000 million litres of alcohol annually by 1980.

52 million child workers

There are 52 million working children in the world, according to the latest estimate of the International Labour Organisation. Some 42 million work without pay in family enterprises and about 10 million are wage-earners in workshops, factories and fields. The total of 52 million is probably only the tip of the iceberg since children under 15 are not covered by statistical surveys in many countries.

Inventory of stolen art

An "Index of Stolen Art/1977" listing over 1,200 stolen works of art, has been issued by the Theft Archive, a New York based non-profit programme. Containing entries from some 20 countries, the Index is the first instalment of an annual publication, complemented by a monthly newsletter. Further information may be obtained from: The International Foundation for Art Research Inc., 46 East 70th St., New York, N.Y. 10021.

The United Nations and disaster relief

The United Nations Postal Administration has issued a set of commemorative stamps on the theme "UNDRO Against Disaster". UNDRO, the Geneva-based Office of the United Nations

Disaster Relief Co-ordinator, co-ordinates and supports international emergency relief aid in disaster-stricken areas. Further information about the stamps, issued in Swiss Franc and U.S. Dollar denominations, may be obtained from: U.N. Postal Administration, Palais des Nations, CH-1211 Geneva 10.

Unesco commemorates Polish educator Janusz Korczak

An international symposium, an exhibition and film shows were among the events organized at Unesco's Paris headquarters between 2 and 12 April to mark the centenary of the birth of the Polish doctor, educator and writer Janusz Korczak, who devoted his life to writing for and about children and to practical work in child welfare, notably as director of a Warsaw orphanage where he developed and practised educational methods far ahead of his time. The organization of the orphanage was based on self-government by the pupils and included such institutions as a children's parliament and a children's court. Korczak died in the Treblinka extermination camp in 1942 after refusing to leave his children and rejecting all attempts to persuade him to escape from the Warsaw ghetto. Part of Unesco's activities within the context of the International Year of the Child, the tribute to Korczak was organized by the Permanent Delegation of the People's Republic of Poland to Unesco and the French Association "The Friends of Janusz Korczak".

International Soil Museum opens in Netherlands

An International Soil Museum, the first of its kind, has been inaugurated at Wageningen, The Netherlands. It presents samples of representative soils from all over the world and by promoting research, training and information exchange will play a vital role in developing a common terminology for all soil scientists. Unesco has actively supported the foundation of the Museum, as part of its work in the soil sciences which has included the preparation and publication of the World Soil Map, a major joint venture with FAO and the International Soil Science Association.

WHO's latest guide to world diseases

The World Health Organization (WHO) has just published the alphabetical index (1) to its 9th revision of the international classification of diseases. Vol. 1, a tabular list, appeared in 1977. The second volume is in three sections: an index of diseases containing the type of information that would be recorded by a physician; an index of external causes of injury, such as fires; and an index of drugs and other chemical substances giving rise to poisoning or other adverse effects.

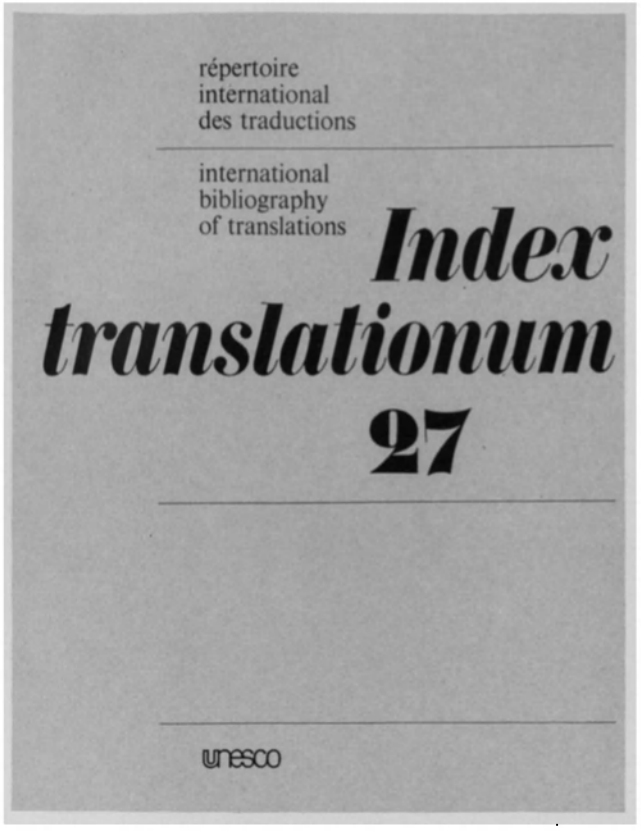
(1) Manual of the International Statistical Classification of Diseases, Injuries and Causes of Death, vol. 2: Alphabetical Index, WHO, Geneva, 30 Swiss francs.

The Ukraine at Unesco

An evening of Ukrainian songs and dancing was held at Unesco headquarters in Paris on 28 March to mark the 25th anniversary of the Ukrainian Soviet Socialist Republic's membership of Unesco. The evening, which featured works performed by a trio of musicians on the bandura, a popular Ukrainian stringed instrument, was organized by the Permanent Delegation to Unesco of the Ukrainian SSR.

The painting reproduced on the cover of our February 1979 issue was erroneously attributed to Juan Ríos Martínez; it was, in fact, the work of his fellow Huichol artist Guadalupe González Ríos — Editor.

BRODARD GRAPHIQUE. COULOMMIERS – Dépôt légal C 1 – Avril 1979 – IMPRIMÉ EN FRANCE (*Printed in France*). Commission paritaire N° 27.253



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What has become of humanity, goodness, modesty, temperance, tenderness, wisdom and piety and what can all these mean to me... if the last sight vouchsafed to my eyes is my city reduced to rubble by fire and sword, and if the last sounds to reach my ears are the cries of women and children as they perish in the ruins?

Voltaire
Philosophical Dictionary